California Environmental Protection Agency

Air Resources Board

INITIAL STATEMENT OF REASONS
FOR
PROPOSED AMENDMENTS TO THE CALIFORNIA REGULATIONS FOR REDUCING VOLATILE ORGANIC COMPOUND EMISSIONS FROM CONSUMER PRODUCTS
AND
AEROSOL COATING PRODUCTS

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State of California
AIR RESOURCES BOARD

PROPOSED AMENDMENTS TO THE CALIFORNIA REGULATIONS FOR REDUCING VOLATILE ORGANIC COMPOUND EMISSIONS FROM CONSUMER PRODUCTS AND AEROSOL COATING PRODUCTS

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State of California
AIR RESOURCES BOARD

INITIAL STATEMENT OF REASONS FOR PROPOSED RULEMAKING

Public Hearing to Consider
PROPOSED AMENDMENTS TO THE CALIFORNIA REGULATIONS FOR REDUCING VOLATILE ORGANIC COMPOUND EMISSIONS FROM CONSUMER PRODUCTS AND AEROSOL COATING PRODUCTS

To be considered by the Air Resources Board on November 21-22, 1996 at

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2020 L Street
Sacramento, California

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Initial Statement of Reasons
for
Proposed Amendments to the California Regulations for Reducing Volatile Organic Compound Emissions from Consumer Products and Aerosol Coating Products

SUMMARY TABLE OF CONTENTS

Table of Contents

Volume I: INTRODUCTION AND EXECUTIVE SUMMARY

Contents **Page**

Table of Contents

Volume II: TECHNICAL SUPPORT DOCUMENT

Contents **Page**

List of Tables

VOLUME I: INTRODUCTION AND EXECUTIVE SUMMARY

I.

INTRODUCTION

This report presents the Air Resources Board (ARB/Board) staff's proposed amendments to the Regulation for Reducing Volatile Organic Compound Emissions from Consumer Products (the "consumer products regulation") and the Regulation for Reducing Volatile Organic Compound Emissions from Aerosol Coating Products (the "aerosol coatings regulation). The amendments to the consumer products regulation are proposed to address certain issues which we and the affected manufacturers have become aware of through implementing the regulation. Additionally, to reflect a recent action by the United States Environmental Protection Agency (U.S. EPA), we are proposing an amendment to exempt perchloroethylene from the volatile organic compound (VOC) definition in the consumer products regulation and the aerosol coatings regulation.

Comprising two volumes, this report represents the Initial Statement of Reasons for Proposed Rulemaking as required by the California Administrative Procedure Act. Volume I, "Introduction and Executive Summary," provides an overview of the purpose of the amendments to the regulation, an overview of the environmental and economic impacts from our proposal, and our recommendations. The summary is presented in question-and-answer format, including commonly asked questions about our efforts to amend the regulations. Volume II, the Technical Support Document (TSD), presents more details on the technical basis for the proposed amendments to the regulations. Also included are five appendices: Appendix A contains the proposed text changes to the consumer products regulation in strikeout/underline format; Appendix B contains the proposed text changes to the aerosol coatings regulation, also in strikeout/underline format; Appendices C-1 and C-2 are the Consumer Products Aerosol Adhesives Survey and the Summary of Aerosol Adhesives Survey Responses, respectively; and Appendix D is a compilation of sample labels for aerosol engine degreasers and aerosol brake cleaners, as referred to in the environmental impacts assessment for the proposed amendment to exempt perchloroethylene from the VOC definition in the consumer products regulation.

A. BACKGROUND

California Clean Air Act

In 1988, the Legislature enacted the California Clean Air Act (CCAA or "the Act"), which declared that attainment of the California state ambient air quality standards is necessary to promote and protect public health, particularly the health of children, older people, and those with respiratory diseases. The Legislature also directed that these standards be attained by the earliest practicable date.

The CCAA added section 41712 to the California Health and Safety Code (HSC) which, along with subsequent amendments, requires the ARB to adopt regulations to achieve the maximum feasible reduction in reactive organic compounds (ROCs) emitted by consumer products (note: ROC is equivalent to volatile organic compound (VOC)). In enacting

section 41712, the Legislature gave the ARB new authority to control emissions from consumer products, an area that had previously been subject to very few air pollution control regulations.

To date, the Board has adopted four regulations to fulfill the requirements of the Act as it pertains to consumer products. On November 8, 1989, the ARB adopted a regulation for reducing VOC emissions from antiperspirants and deodorants (the "antiperspirant and deodorant regulation;" sections 94500-94506.5, Title 17, California Code of Regulations (CCR)). The ARB then adopted a more comprehensive regulation for reducing VOC emissions from 26 additional categories of consumer products, which was adopted by the Board in two phases (the "consumer products regulation;" sections 94507-94517, Title 17, CCR). Phase I was adopted on October 11, 1990, and Phase II was adopted on January 9, 1992.

The first regulation, adopted by the Board in November 1989, required a reduction in VOC emissions from antiperspirants and deodorants. The second regulation, adopted in October 1990, required a reduction in VOC emissions from 16 different categories of consumer products. This regulatory action is commonly referred to as Phase I. In January 1992, the Board adopted amendments to the Phase I regulation to achieve the maximum feasible reduction in VOCs from consumer products. These amendments added ten more categories to the consumer products regulation and are referred to as the Phase II amendments.

To ensure consistency in the regulatory requirements of all the consumer products regulations, the antiperspirant and deodorant regulation was also amended during both the Phase I and Phase II rulemakings. Combined, these regulations (Phase I, Phase II, and the antiperspirant and deodorant regulation) establish standards for 27 different consumer product categories. The regulations are contained in Title 17, CCR, sections 94500-94517. The above consumer product regulations reduce VOC emissions primarily through specification of maximum allowable VOC content limits (by weight percent) for individual product categories.

On September 22, 1994, the Board adopted the third regulation, the "Alternative Control Plan Regulation for Consumer Products" (the "ACP"). The ACP was subsequently approved by the Office of Administrative Law (OAL) and became legally effective on September 9, 1995. This voluntary, market-based regulation employs the well-established concept of an aggregate emissions cap or "bubble." This program supplements existing regulations by providing consumer products and aerosol coatings manufacturers additional flexibility when formulating consumer products. This regulation is contained in Title 17, CCR, sections 94540-94555.

The Board adopted a fourth regulation on March 23, 1995, the "Regulation to Reduce Volatile Organic Compound Emissions from Aerosol Coating Products" (the "aerosol coatings regulation"). This regulation limits the VOC content for 35 categories of aerosol coatings. At the same time, the ACP was amended to make it possible to "bubble" aerosol coatings emissions. The aerosol coatings regulation and the amendments to the ACP were approved by the OAL on January 8, 1996. The aerosol coatings regulation is contained in Title 17, CCR, sections 94520-94528.

In this report, these four regulations are collectively referred to as the "consumer products

regulations" unless otherwise noted.

The State Implementation Plan

On November 15, 1994, the ARB adopted the State Implementation Plan (SIP) for ozone. The SIP serves as California's overall long-term plan for the attainment of the federal ambient air quality standard for ozone. Achieving significant VOC reductions from consumer products is a key element of the SIP. Together with significant reductions from stationary industrial facilities, mobile sources (e.g., cars, trains, boats), and other area sources (e.g., architectural and industrial maintenance coatings), the reductions in the consumer products element of the SIP are an essential part of California's effort to attain the air quality standards for ozone. The VOC reductions from consumer products are also needed to help several local air pollution control districts meet rate-of-progress requirements in the federal Clean Air Act (CAA).

The consumer products component of the SIP is a multi-faceted program comprising "near-term," "mid-term," and "long-term" control measures. The near-term SIP measures comprise our existing consumer products regulations. The mid-term measures consist of regulations to cover additional product categories not currently subject to the existing regulations. The long-term measures rely on new technologies with components of market incentives and consumer education.

In the SIP, the ARB has committed to an overall 85 percent reduction in consumer product emissions by the year 2010 (including the adopted regulations). This reduction is necessary for the South Coast Air Basin, among others, to attain the federal ozone standard and meet the rate-of-progress requirements under the CAA. Under the SIP, the various control measures will contribute the following emission reductions:

30 percent will come from the near-term measures,
25 percent will come from the mid-term measures,
30 percent will come from the long-term measures.

On November 15, 1994, the ARB submitted the consumer products Phase I and II regulations and the antiperspirant and deodorant regulation to the United States Environmental Protection Agency (U.S. EPA) for approval as a SIP revision. On January 13, 1995, the U.S. EPA determined the submittal to be complete and approved the regulations on February 14, 1995. The U.S. EPA's approval of the consumer products regulations was published in the Federal Register on August 21, 1995. The ACP was recently submitted to the U.S. EPA. We plan to submit the first tier standards for the aerosol coatings regulation to the U.S. EPA in the near future, and we will submit the second tier standards, which are not effective until December 31, 1999 (at the earliest), at a later date.

B. CONSUMER PRODUCTS REGULATIONS - HISTORY AND STRUCTURE

As noted previously, the Board has adopted four regulations to fulfill the requirements of the Act as it pertains to consumer products. Although these regulations employ a traditional regulatory approach, they also provide flexibility to manufacturers. First, the regulations specify performance standards which must be met, but they do not specify how products are to be reformulated to meet the standards. Manufacturers are free to meet the VOC content limits however they choose, provided that their products do not exceed the limits.

Moreover, these regulations provide additional flexibility through the Innovative Products Provision. This provision allows the sale of products which exceed the VOC limits but through special formulation or packaging emit less VOCs than a representative product which meets the applicable limit.

To provide even greater flexibility, the ARB, on September 22, 1994, adopted the third consumer products regulation, the ACP. This regulation, which was approved by the OAL on September 9, 1995, provides manufacturers subject to the Phase I and II regulations with alternative means to comply with the regulations. The ACP is a voluntary, market-based regulation which enables manufacturers to comply with the consumer products regulation by establishing an emissions "cap" or "bubble." An emissions bubble places an overall limit on the aggregate emissions from a group of products, rather than placing a limit on the VOC content or emissions from each individual product. As such, the ACP supplements the existing regulations, providing an unprecedented level of flexibility to participating manufacturers. By design, the ACP provides this additional flexibility while also being equivalent to the existing regulations in reducing emissions.

Manufacturers who voluntarily choose to enter the ACP program would select the products and formulate a detailed ACP bubble program ("ACP plan") for those products. An approved ACP plan is contingent upon whether it satisfactorily meets the approval process requirements. An approvable ACP plan demonstrates that the total VOC emissions under the bubble do not exceed the emissions that would have resulted had the products been formulated to meet the VOC standards. In addition, the proposed plan must be based on accurate and enforceable records of ACP product sales in California to ensure that all emissions reductions are real and quantifiable.

Once approved, the manufacturer must sell its products in accordance with the conditions contained within the ACP plan. Under an approved ACP plan, the manufacturer could sell products that exceed the VOC standards specified in the existing regulations, provided that the emissions from these high-VOC products will be sufficiently offset by the emissions from products reformulated to "overcomply" with the VOC standards. Overall, compliance with approved ACP plans will ensure that the total VOC emissions from the selected products will be no greater than the aggregate emissions that would have occurred if the products had been reformulated to meet the existing standards. To date, one manufacturer has an approved ACP plan.

Aerosol coatings were not included in the original definition of "consumer product" in the Act even though aerosol coatings are a large source of VOC emissions relative to the other consumer product categories. However, two legislative actions amended Health and Safety Code section 41712 to include aerosol coatings in the definition of consumer products and require

specific reductions in VOC emissions from aerosol coatings. Assembly Bill 2783 and Assembly Bill 1890, approved by the Governor in 1992 and 1993, respectively, give the Board new authority to regulate aerosol coatings (AB 2783, Sher; Stats. 1992, Chapter 945 and AB 1890, Sher; Stats. 1993, Chapter 1028). The Aerosol Coatings Regulation was adopted on March 23, 1995, and was approved by OAL on January 8, 1996. The regulation is contained in Title 17, CCR, sections 94520-94528. At the same time, the ACP regulation was amended to allow manufacturers the option of voluntarily entering into an alternative control plan which is limited to the "bubbling" of aerosol coating products emissions. This is separate from the "bubbling" already allowed under the ACP for consumer products.

On September 28, 1995, amendments to the aerosol coatings regulation, the consumer products regulation, and the antiperspirant and deodorant regulation were proposed to the Board. These proposed amendments addressed some potential fairness issues that had been brought to the Board's attention in regard to the antiperspirant and deodorant regulation. Additionally, the exemption of three compounds and one class of compounds from the VOC definition in the three regulations was proposed. These compounds included parachlorobenzotrifluoride, ethane, acetone, and the entire class of cyclic, branched or linear, completely methylated siloxanes. On September 28, 1995, the Board adopted the proposed amendments, which were then approved by the OAL and became legally effective on March 30, 1996. The amended consumer products regulation and antiperspirant and deodorant regulation were submitted as SIP revisions to the U.S. EPA on August 27, 1996. As discussed earlier, the first tier standards of the aerosol coatings regulation will be submitted to the U.S. EPA in the near future.

II.

EXECUTIVE SUMMARY

A. INTRODUCTION

In this chapter, we provide a plain English discussion of staff's proposed major amendments to the consumer products and aerosol coatings regulations, and explain the rationale for each provision. Also provided is a discussion of the comparable federal regulation and a summary of the ARB staff's process and findings for the technical assessment component of this report. The discussion in this chapter is intended to satisfy the requirements of Government Code 11346.2(a)(1), which requires that a noncontrolling "plain English" summary of the regulation be made available to the public. A more detailed discussion of the proposed regulatory amendments may be found in the Technical Support Document, Volume II, Chapter III.

B. COMPARABLE FEDERAL REGULATIONS

The U.S. EPA recently published a proposed rule, National Volatile Organic Compound Emissions Standards for Consumer Products, which appeared in the April 2, 1996, Federal Register (Vol. 61, No. 64, pages 14531-14543). This regulation is similar to the ARB's consumer products regulation, although some differences do exist. The proposed rule specifies VOC standards for antiperspirants and deodorants and other consumer products (but not for aerosol coatings). The U.S. EPA's proposed rule applies nationwide to consumer product manufacturers, importers, and distributors (but not retailers), while the ARB regulation applies to any person (including retailers) who "sells, supplies, offers for sale, or manufactures consumer products for use in the State of California." The U.S. EPA's rule does not regulate several product categories which are regulated under the ARB regulation. All of the VOC standards in the U.S. EPA's proposed rule have a standard effective date of September 1, 1996, whereas the VOC standards in the ARB regulation are phased in at various dates from 1993 to 1999. Unlike the ARB regulation, the U.S. EPA's proposed rule does not have a second tier of "future effective" VOC standards for any product category. Finally, the U.S. EPA's proposed rule has an unlimited "sell-through" period for non-complying products manufactured before the effective date of the standards, whereas the ARB regulation allows only an 18-month sell-through period.

Whenever possible, the ARB strives to harmonize its rules with federal regulations addressing the same issues. However, Phase I of the ARB consumer products regulation has been in existence since 1990, and Phase II was adopted by the Board in 1992. Both phases therefore predate the proposed U.S. EPA regulation by several years. Additionally, the proposed U.S. EPA regulation is less effective in reducing emissions than is the ARB regulation in several areas. Consequently, amending the California consumer product regulation to eliminate conflict with the U.S. EPA's regulation would reduce the air quality benefits of the regulation and would significantly change the rules in California after manufacturers have expended significant resources to comply with them. In summary, given the serious nature of the air pollution problem in California, the benefit to human health and the environment justifies a California consumer products regulation that results in greater emissions reductions than would the proposed U.S.

EPA regulation.

C. TECHNICAL ASSESSMENT

At the Phase I and II consumer products regulation adoption hearings, the Board directed the Executive Officer to consult with the consumer product manufacturers who must achieve the future effective VOC limits and to report to the Board on the manufacturers' progress (in Board Resolutions 90-60 and 92-1, respectively). These reports are intended to identify any significant problems with the technical and commercial feasibility of achieving the future effective standards on time and propose any regulatory modifications that may be appropriate. The Board directed the Executive Officer to consult the regulated public and any other interested parties in preparation of the reports and to provide these interested parties an opportunity to make verbal and written comments to the Board in conjunction with these reports.

On November 16, 1995, we provided the Board with a verbal report on our assessment of manufacturers' progress in meeting those 1996 future-effective standards for single-phase aerosol air fresheners, engine degreasers, "all other forms" glass cleaners, and nail polish removers. We were able to report that manufacturers were on schedule towards meeting the standards and amendments to the standards were not proposed.

For this year's report to the Board, we have completed a comprehensive analysis of the ability of manufacturers to meet the following four standards which become effective January 1, 1997: automotive brake cleaners, fabric protectants, aerosol dusting aids, and aerosol adhesives. Our investigation has not identified significant problems arising in regard to the ability of manufacturers to meet the upcoming automotive brake cleaner standard or the future effective standards for fabric protectants and aerosol dusting aids on time. Based on our technical analysis, including an exhaustive outreach effort (consisting of discussions with manufacturers which, when combined, represent most or all of the market in each of the product categories), a review of the technical literature, and our previously conducted industry survey, we believe that the January 1, 1997 standards are technologically and commercially feasible as required by section 41712 of the California Health and Safety Code.

However, we have determined that it is appropriate to propose postponing the future effective standard for aerosol adhesives. Most manufacturers are having substantial difficulty meeting the 25 percent VOC standard by the effective date of January 1, 1997.

D. PROPOSED AMENDMENTS TO THE CONSUMER PRODUCTS REGULATION AND THE AEROSOL COATINGS REGULATION

1. Why are we proposing to amend the consumer products regulation and the

aerosol coatings regulation?

We are proposing amendments to address concerns identified by manufacturers and ARB staff, to improve the consistency and clarity of California's consumer products regulations, and to enhance enforcement of the regulation. We believe the proposed modifications will address these concerns while preserving the emission reductions from consumer products claimed in the State Implementation Plan (SIP) for ozone.

2. What are the goals of the modifications to the consumer products regulation and the aerosol coatings regulation?

Our primary goals include the following:

- address concerns raised by consumer product manufacturers
- improve the consistency and clarity of the consumer products regulation
- preserve projected emission reductions required by the SIP
- facilitate manufacturers in their efforts to develop complying products
- make the VOC definition in the consumer products regulation and the aerosol coatings regulation consistent with U.S. EPA's VOC definition
- incorporate ARB Method 310 (presented to the Board as a separate item) into the consumer products regulation as the primary instrument for compliance determination

3. How did staff develop the amendments to the consumer products regulation?

When investigating the future effective standards for aerosol dusting aids, automotive brake cleaners, and fabric protectants, the staff contacted the majority of manufacturers identified in our consumer products database which identifies companies selling these products in California in 1990. We also reviewed technical literature to locate pertinent references. Through telephone surveys, manufacturers and distributors representing very large proportions of the market were contacted and questioned regarding their progress and concerns in meeting the January 1, 1997, standards for these categories. Additionally, the 1990 consumer products database was used to determine the types of formulations available at that time.

In developing a revised definition for contact adhesives, we consulted with contact adhesive manufacturers and investigated a variety of products. In developing the aerosol adhesives proposed amendment, the staff consulted with numerous individual consumer products manufacturers by telephone. The 1990 consumer products database was consulted extensively to locate manufacturers and determine the types of formulations available at that time. We also conducted a survey of manufacturers and distributors for 1995. Manufacturers, including the 3M Company, Sherwin-Williams, Wilsonart International, Loctite, and DAP, participated in survey development, as was the Adhesive and Sealant Council. Also participating was the Ventura County Air Pollution Control District. The manufacturers participating in this most recent survey represent what we estimate to be the majority of the 1995 market, by sales. Several meetings were also held during the development of the proposed amendment, including meetings with the 3M Company and two teleconferences with additional companies.

On August 7, 1996, we sent out our draft "Inital Statement of Reasons for Proposed Amendments to the California Regulations for Reducing Volatile Organic Compound Emissions from Consumer Products and Aerosol Coating Products," along with notification of our intent to hold a public workshop, to each of the approximately 3000 individuals on our consumer products mailing list. The workshop to discuss these proposed amendments was held on August 22, 1996.

4. What amendments are proposed for the consumer products and aerosol coatings regulations?

We are proposing several amendments to the consumer products regulation and one amendment to the aerosol coatings regulation. The first three of the amendments presented here are major changes to the regulations and are discussed in more detail in Volume II - Technical Support Document. The proposed amendments are to:

- postpone the 25 percent standard for aerosol adhesives in the consumer products regulation to 2002 based on the staff's technical analysis;
- modify the VOC definition in the consumer products regulation and the aerosol coatings regulation to exempt perchloroethylene;
- amend provisions and definitions in the consumer products regulation to enhance clarity and compliance and improve consistency with the antiperspirant and deodorant regulation;
- amend the definitions for household adhesives, general purpose adhesives, contact adhesives, and construction and panel adhesives in the consumer products regulation to improve clarity; and,
- amend the code-dating requirement in the consumer products regulation to exempt manufacturers of zero-VOC products from the need to code-date those products.

a. Postpone the 25 percent standard for aerosol adhesives to 2002 based on staff's technical analysis:

This proposed amendment would amend the Table of Standards to extend the effective date of the 25 percent VOC standard for aerosol adhesives from January 1, 1997, to January 1, 2002, a five-year extension. Based on current survey results and discussions with aerosol adhesive manufacturers**,** it appears that industry cannot achieve the 25 percent VOC standard by the current effective date of January 1, 1997. We have made this determination because those in the market that can comply are only able to do so with a toxic air contaminant-based technology, which is not viable for many of the affected products. The one available technology for aerosol adhesives requires reformulation with methylene chloride, which has been identified as a toxic air contaminant by the ARB. The products that can comply through the use of methylene chloride are a small portion of the market. Finally, many manufacturers have corporate policies against the use of methylene chloride due to health concerns. Because of these factors, we do not believe it is appropriate to maintain the original effective date of the standard and place manufacturers in the position of having to rely upon this single technology. This will result in a delay in receiving the anticipated emission reductions of up to 0.2 tons/day from this single category. However, overall SIP commitments for emission reductions from the consumer

products regulation will not be compromised because the reductions in some other categories are greater than anticipated and are sufficient to maintain the emission reductions contained in the SIP.

Despite manufacturers' concerns about poor or inadequate product performance in certain applications, some manufacturers have indicated that they may use methylene chloride to comply with the 25 percent VOC standard if it becomes effective next January as scheduled. It was not our intention to rely upon the exclusive use of methylene chloride when the 25 percent standard was adopted by the Board in 1990. At the time of adoption, it was understood that there were other promising technologies. Therefore, we recommend that an additional five years for continued research and development be allowed to enable manufacturers to explore reformulation options that do not rely exclusively upon the use of methylene chloride. Also, under the proposal, the Reporting Requirements section would be amended to require industry to provide data, by March 31, 1999, regarding product sales and composition for the year 1998 as well as a written update of their research and development efforts. The Board would hold a public hearing in the year 2000 to review and consider any appropriate modifications to the 25 percent VOC standard.

b. Modify the VOC definition in the consumer products regulation and the aerosol coatings regulation to exempt perchloroethylene:

Based on a technical analysis and an evaluation of the potential impacts, we are proposing to modify the VOC definition to exempt perchloroethylene in both the consumer products regulation and the aerosol coatings regulation. This proposal follows similar action in March 1996 by the United States Environmental Protection Agency (U.S. EPA), which exempted perchloroethylene from their VOC definition. For the sake of consistency with the U.S. EPA, we are also proposing to exempt this compound from the VOC definition in the aerosol coatings regulation. Through a technical analysis discussed in Volume II, we determined that this proposal is justified because perchloroethylene is less photochemically reactive than other compounds that are already exempt, and it appears that exempting perchloroethylene in the aerosol coatings regulation would not result in significant adverse impacts to human or environmental health. However, the ARB staff has determined that there is a slight possibility that the exemption of perchloroethylene from the VOC definition in the consumer products regulation may have an adverse impact on the environment. Since the possibility of an adverse impact from the proposed exemption is very slight, we recommend that perchloroethylene be exempted from the VOC definition in the consumer products regulation. However, we propose that the perchloroethylene emissions from consumer products be closely monitored. From this monitoring effort, we will evaluate the public exposure to perchloroethylene and determine the need for potential control of perchloroethylene emissions from consumer products under the California Toxic Air Contaminant Identification and Control Program.

c. Amend provisions and definitions in the consumer products regulation to enhance clarity and compliance and improve consistency with the antiperspirant and deodorant regulation:

We are proposing to amend several definitions and make minor changes to correct typographical errors in the consumer products regulation. We are proposing to amend the "flying

bug insecticide" and "crawling bug insecticide" definitions to clarify that the categories do not apply to certain highly specialized insecticides: the crawling bug definition is being amended to clarify that the insecticide standard does not apply to products active specifically against house dust mites, and the flying bug definition is being amended to clarify that products acting specifically to protect fabrics from moth damage are not subject to regulation. These changes clarify our original intent in proposing these standards and in no way compromise emission benefits claimed in the SIP. Standards for these specialized categories may be proposed at a later date with full public participation as is usual when new standards are adopted. We are also proposing to update the "consumer product" definition to reflect recent changes to the definition of consumer products in section 41712 of the California Health and Safety Code. Specifically, we are proposing to add aerosol coatings to the list of products considered "consumer products" in the Health and Safety Code. As the definition of "consumer product" in the consumer products regulation is based on this Health and Safety Code definition, it is appropriate to propose this amendment in response to this recent change.

We are proposing an amendment to the "charcoal lighter material" definition to specifically exempt non-chemically formulated "fat woods" (i.e., naturally occurring high-resin kindling) from the definition. Although consumer products are specifically defined as consisting of only chemically formulated products, there has been some confusion in the past as to whether "fat woods" are subject to the requirements for charcoal lighter materials specifically and the consumer products regulation generally. This amendment clarifies that they are not subject to the requirements of the consumer products regulation. As a part of this proposed amendment we are adding a definition for "fat woods." Additionally, we are proposing an amendment to clarify that charcoal lighter materials may not use the exemption for low vapor pressure materials to meet the requirement for charcoal lighter material. Rather, they must fulfill the requirements in section 94509(h) "Requirements for Charcoal Lighter Material." This clarification will not affect the current status of exempted charcoal lighter material manufacturer's products.

We are also proposing to rename the "LVP Compound" definition to "LVP-VOC." This amendment is to clarify that LVPs are VOCs as defined in section 94508(a)(90) of the consumer products regulation. A related proposed amendment is to delete the second LVP definition that is included in the "Exemptions" section and to instead refer back to the LVP-VOC definition already included in the "Definitions" section. These are both minor changes intended to clarify these provisions and neither of these proposed amendments will have any impact on the LVP exemption.

The consumer products regulation is being restructured to clarify how VOC content is defined and calculated. In the Table of Standards, the regulation sets limits on the VOC content of various consumer products (i.e., the "Percent VOCs by Weight"). To show manufacturers how to calculate the "Percent VOCs by Weight" the regulation currently defines "Percent-by-Weight" in the Definitions section of the regulation.

The current language and structure may be confusing, because the regulated community typically views the regulation as restricting the "VOC content" of consumer products rather than the "Percent-by-Weight." Additionally, the method to determine VOC content is more appropriately placed in the "Test Methods" section rather than in the "Definitions" section. In

the interests of clarity and completeness, we are proposing the following changes: (1) we are including a change to the "Test Methods" section (which is being proposed to the Board as a separate item), which specifies that ARB Method 310 will be used to determine compliance with the regulatory limits, (2) we are proposing to move the equation used to determine "Percent-by-Weight" to the "Test Methods" section, and (3) we are proposing to add the term "VOC Content" to the Definitions section, with the "VOC Content" definition referring the reader to the Test Methods section for the appropriate method to determine the percent-by-weight of VOCs. Therefore, there will be two ways to determine VOC content in the "Test Methods" section: (1) by actually testing the product using Method 310, or (2) calculating the VOC content of the product using formulation data from manufacturers' records.

One final change is also being proposed to the Test Methods section. As mentioned above, the proposed amendments to the "Test Methods" section would provide two ways to determine VOC content. These two ways should yield similar results in the vast majority of cases, but there may be situations in which the results will be different. Such a discrepancy could be caused by manufacturer's records being inaccurate for some reason. Inaccuracies could be caused by such problems as clerical errors or by production errors in which too much VOC was accidentally added to a particular batch of product. In the case of such a conflict, we propose to specify in the regulation that the results of Method 310 (i.e., actual physical testing of an individual product sample) take precedence over results that are simply calculated from manufacturer's records.

An amendment is proposed to the Table of Standards regarding dilution of products. We have become aware that there are consumer products which direct the user to dilute concentrates with VOC solvent, rather than with water or non-VOC solvent. This amendment would address those products that are diluted with VOCs as well as those that are diluted with non-VOC solvents or water. This amendment clarifies that the VOC content must be based on the "after dilution" VOC content, whether the product is diluted with VOC solvent, non-VOC solvent, or water.

We are also proposing to remove from the Table of Standards a reference regarding the lack of a sell-through period for consumer products with an effective date of January 1, 1993 sold in the Bay Area Air Quality Management District (BAAQMD). Because the 18-month sell-through period for those products sold in the rest of California would have expired on July 1, 1994, no products with an effective date of January 1, 1993, that exceed the VOC standard may now be sold in California under the sell-through provision. Therefore, this provision is no longer necessary.

An amendment to the Administrative Requirements is proposed which clarifies that it is not permissible to remove or make illegible the date or code-date information from any regulated product. The amendment of this section would assist in alleviating the concerns that retailers and manufacturers have with diverter companies that purchase products outside of the normal distribution channels and remove dates, code-dates, or batch codes from consumer products. This amendment would allow enforcement against diverters instead of putting legitimate retailers and manufacturers at risk for enforcement action when date or code-dates are removed.

The "Registration" section has been renamed to "Reporting Requirements" to more correctly characterize the requirements of this section. This amendment is proposed to clarify that the responsible party (i.e., the company whose name is on the label or for whom the products was made) need only supply registration data upon request. As presently worded, it is possible to misinterpret the section as indicating the registration data must be submitted yearly and also for new products. Additionally, the words "manufacturer" and "responsible party" are used interchangeably in this section. This proposed amendment replaces the term "manufacturer" with the term "responsible party." This amendment would ensure that the term "responsible party" is used consistently throughout the regulation and would clarify that it is the "responsible party" who must supply the data described in the Registration Provision upon request, not necessarily the manufacturer.

A proposed amendment to the "Test Methods" section would make the provision consistent with the antiperspirant and deodorant regulation and would establish that it is not permissible to modify, change or fabricate records used in the manufacture of a product to verify compliance.

For clarity and completeness, the "Test Methods" section (section 94515(a)) also includes underline/strikeout text indicating an amendment that is being proposed to the Board as a separate item. This amendment proposes to replace the test methods originally incorporated in the consumer products regulation with the newly developed ARB Method 310. The text proposed for deletion is shown in ~~*italics/strikeout*~~ and the new text is shown in ***bold/italics/underline***.

Miscellaneous proposed amendments to improve the clarity of the regulation include, among other minor changes, reformatting of the equation used to qualify a consumer product as "innovative" and the addition of descriptive headings to some sections.

d. Amend definitions for "household adhesives," "construction and panel adhesives," "general purpose adhesives," and "contact adhesives" to improve clarity:

We are proposing that the term "household" be deleted from the adhesive categories as the regulation was intended to include industrial and institutional as well as household adhesives. This change is needed to clarify that industrial and institutional adhesives are subject to the regulation if used to maintain or operate an establishment. The current definition for "Construction and Panel Adhesive" is too restrictive as it unintentionally excludes construction and panel adhesives that are marketed in anything other than 1/10 gallon or 11 fluid ounce containers. Therefore, the size limitation for this category would be deleted from the definition to remove ambiguity.

In response to industry comments, we have added wording to the definition for "General

Purpose Adhesive" to clarify that products intended to be used on a specific substrate are not included in the definition. The “Contact Adhesive” definition would be amended to streamline the product determination process by eliminating the need for laboratory tests and by identifying products based on usage instructions found on product labels, as well as information contained in other product literature provided by manufacturers. We are proposing to eliminate the reference to specific formulation types from the definition because manufacturers may be able to develop contact adhesives using polymers other than those listed in the current definition.

e. Amend the code-dating requirement to exempt manufacturers of zero-VOC products from the need to code-date those products:

This amendment is proposed to provide relief to manufacturers because we have determined that products containing no VOCs, or products with very small amounts of VOCs (namely, those products with a VOC concentration of 0.10 percent VOC by weight or less) do not require code-dating. However, code-dating is still required for all products that contain greater than 0.10 percent by weight VOCs, even those VOCs that are determined to be low vapor pressure VOCs.

E. ENVIRONMENTAL IMPACTS OF THE PROPOSED AMENDMENTS

We have determined that two of the proposed modifications may potentially have an adverse impact: (1) the proposal to extend the standard for aerosol adhesives, and (2) the proposal to exempt perchloroethylene from the VOC definition in the consumer products and aerosol coatings regulations.

In regard to the proposal to extend the VOC standard compliance date for aerosol adhesives, the primary environmental impact of postponing the standard is that of fewer VOC emission reductions obtained during the period from 1997 to 2002. However, we have identified reductions from the first tier standards in the aerosol coatings regulation that may be used to make up the lost emission reductions in the interim. In extending the standard to 2002, one possible benefit is a reduction in the potential for increased exposure to methylene chloride. This benefit is possible because some manufacturers plan to increase the amount of methylene chloride in their products to achieve the standard if it is not postponed to allow additional time for development of an alternative. Therefore, although we have identified a potential adverse impact, in the form of a temporary maximum VOC emission increase of approximately 0.2 tons/day, we believe that the considerations discussed above override any adverse environmental impacts that might possibly occur as a result of the postponement.

With regard to the proposal to exempt perchloroethylene from the VOC definition in the consumer products regulation, we have conducted a comprehensive environmental impacts analysis as required by the California Environmental Quality Act (CEQA). We evaluated the proposal’s potential impacts on water quality, landfill loading, stratospheric ozone depletion, global warming, ground-level ozone formation, and air toxicity. Based on our findings, we believe there is a slight possibility that the exemption of perchloroethylene in the consumer products regulation may have an adverse impact on the environment. Therefore, staff proposes that the use of perchloroethylene in consumer products be closely monitored and, if we determine

that adverse impacts are occurring, steps can be taken to protect public health, such as developing an Airborne Toxic Control Measure or stepping up public outreach efforts.

For consistency, we are also proposing to exempt perchloroethylene from the VOC definition in the aerosol coatings regulation. We have determined that the proposed exemption of perchloroethylene in the aerosol coatings regulation will have no adverse environmental impacts. This is because the aerosol coatings regulation contains a provision which essentially prohibits "new uses" of perchloroethylene. Specifically, the provision prohibits any person from selling, supplying, offering for sale, applying, or manufacturing for use in California any aerosol coating product which contains perchloroethylene, except for the following:

(1) existing complying products containing perchloroethylene that were sold in California in 1992, or
(2) noncomplying products containing perchloroethylene that were sold in California in 1992 that were reformulated to comply with the aerosol coatings regulation, as long as the content of perchloroethylene does not increase.

Because an ARB survey of aerosol coating products sold in 1992 revealed no products containing perchloroethylene, there does not appear to be the potential for an increased use of perchloroethylene in aerosol coating products.

F. ECONOMIC IMPACTS OF THE PROPOSED MODIFICATIONS TO THE REGULATION, INCLUDING THE IMPACTS ON EMPLOYMENT, BUSINESS CREATION AND EXPANSION, AND COMPETITIVENESS WITH BUSINESSES OUTSIDE OF CALIFORNIA

Because of the increased flexibility available in the reformulation of new products and the decreased administrative burdens associated with several of the amendments, we do not expect an adverse impact on manufacturers' profitability, employment in California, the status of California businesses, or competitiveness of California businesses with other states. In fact, they may experience a positive economic impact because of the additional time manufacturers will have to reach the future effective aerosol adhesives standard, the improved clarity of the regulation, and the decreased administrative burden for some manufacturers.

The California consumers may also benefit from the availability of more types of products and, to the extent that the manufacturers' cost savings are passed on to the consumer, less expensive products. Because the proposed amendments affect all manufacturers and marketers in the same way, regardless of their location, California businesses would not be at a competitive disadvantage nor would the amendments have a noticeable impact on employment and the status of business in California as they impose no additional costs on businesses.

G. HOW THESE PROPOSED MODIFICATIONS FIT INTO THE STATE IMPLEMENTATION PLAN (SIP)

As described in the Introduction, the consumer product component of the State

Implementation Plan (SIP) is a multi-faceted program which includes "near-term," "mid-term," and "long-term" measures. The near-term SIP measures comprise the consumer products regulation, the antiperspirant and deodorant regulation, the alternative control plan, and the aerosol coatings regulation.

The only amendment that could affect the SIP is the proposal to postpone the future-effective standard for aerosol adhesives in the consumer products regulation to January 1, 2002. However, we have identified reductions from the first tier standards in the aerosol coatings regulation that were not fully claimed in the SIP until the 2002 milestone year, although the reductions are being achieved before then. When these reductions are taken into account, the overall progress in reducing emissions from the entire consumer products and aerosol coatings regulations are maintained, despite the delay in the effective date for aerosol adhesives. In 2002, when the total emission reductions are claimed, the 0.2 tons/day emission reduction will have to be achieved by the aerosol adhesives category, or by another consumer product category that will achieve equivalent emission reductions (in excess of our current SIP commitments), to avoid a SIP shortfall. Using this approach, the proposed amendment to the aerosol adhesives does not compromise our ability to meet rate-of-progress requirements or demonstrate attainment.

H. LOW VAPOR PRESSURE (LVP)-VOC EXEMPTION STATUS

When the consumer products regulation was adopted in 1990, an exemption was provided for VOCs with low volatility. In establishing this exemption, a vapor pressure cutoff of less than 0.1 mm Hg at 20^{o}C was identified and incorporated into the regulation. The literature available at the time of adoption indicated that most compounds which would qualify as LVPs would be high molecular weight resins, surfactants, waxes, and other solid or semi-solid product ingredients which were not expected to significantly evaporate and contribute to ozone formation.

However, since adoption of the consumer products regulation, several types of low vapor pressure liquid VOC solvent mixtures have been developed and used by consumer product formulators. While the regulation allows the use of these mixtures, their potential for widespread use as solvents makes it important that the ARB adopt a test method to quantify and verify that only LVP-VOCs are exempted from the calculated VOC content. Additionally, when solvent mixtures rather than pure compounds are used, manufacturers have shown us that it is difficult to characterize each component of the mixture to the extent necessary to obtain the exemption. We have been asked to accept the use of alternative procedures which characterize the mixture (for example, an initial boiling point determination) rather than require speciation and characterization of every component of the mixture. The consumer products regulation does not currently specify a test procedure which can accomplish this. In response to manufacturers' requests, we agreed that in the interim period, we will allow the use of the less specific procedure suggested by industry for mixtures. This will allow additional time to work with the affected industry on development of an appropriate procedure for mixtures prior to a Board hearing on this matter.

The ARB staff has been working to develop a procedure that can reasonably determine if the individual compounds in the mixture conform to the criteria in the LVP exemption. A draft test procedure has been developed which constitutes a modification to American Society for

Testing and Materials (ASTM) D2879-92, referred to as the "isoteniscope" procedure. ASTM D2879-92 most accurately measures the vapor pressure of pure liquids. The modification of the procedure is intended to improve the accuracy of the procedure when measuring the vapor pressure of VOC liquid mixtures. The modified isoteniscope procedure will be proposed to the Board when the method has been peer-reviewed and an interlaboratory comparison analysis is completed. Corresponding clarification of the language for the LVP-VOC definition will also be made. We anticipate that this effort, including another workshop, will take additional time to complete.

III.

RECOMMENDATIONS

We recommend that the Board approve the proposed amendments to the consumer products regulation and the aerosol coatings regulation.

VOLUME II: TECHNICAL SUPPORT DOCUMENT

I.

INTRODUCTION

A. OVERVIEW

In Volume II of the Initial Statement of Reasons (ISOR) for Proposed Rulemaking - Technical Support Document (TSD), we present our technical justification and analysis of the proposed amendments to the consumer products regulation and the aerosol coatings regulation. We also present our assessment of whether any significant problems exist regarding the upcoming standard for automotive brake cleaners and the three upcoming future effective standards for aerosol dusting aids, fabric protectants, and aerosol adhesives.

Chapter II assesses the progress manufacturers have made toward meeting the upcoming standard for automotive brake cleaners and the future effective standards for fabric protectants and dusting aids. As we are proposing to postpone the effective date for the second-tier standard in the aerosol adhesives category, our technical discussion is presented in Chapter III, Summary and Technical Basis for the Proposed Amendments. Chapter III provides a description of the proposed amendment to the aerosol adhesives standard and the technical discussion for the proposed amendment. Also included is a description and the technical basis for the additional proposed amendments. These include the amendments clarifying definitions and provisions in the consumer products regulation and the amendment to the volatile organic compound (VOC) definition in the consumer products and aerosol coatings regulations.

Chapter IV provides the environmental and economic impacts analyses for the proposed amendments. Chapter V provides a discussion on the low vapor pressure (LVP)-VOC exemption issue and a description of our future plans regarding this provision.

B. HISTORY AND DESCRIPTION OF THE TECHNICAL ASSESSMENT FOR THE UPCOMING VOC STANDARDS

On October 11, 1990, the Board adopted Phase I of the consumer products regulation, which established standards for 16 categories of consumer products. On January 9, 1992, the Board adopted Phase II of the consumer products regulation which established standards for an additional ten product categories.

At both hearings, the Board directed the Executive Officer to consult with the consumer product manufacturers who must achieve the future effective VOC limits specified in the Table of Standards and to provide reports on manufacturers' progress to the Board (in Board Resolutions 90-60 and 92-1, respectively). These reports are intended to identify any significant problems arising in regard to the future effective standards and propose any regulatory modifications that may be appropriate. The Board directed the Executive Officer to consult the regulated public and any other interested parties in the preparation of the reports and to provide these interested parties with an opportunity to make oral and written comments to the Board in conjunction with these reports.

The following is the result of our technical assessment regarding fabric protectants, aerosol dusting aids, aerosol adhesives, and automotive brake cleaners. The standard for automotive brake cleaners and the future effective standards for fabric protectants, aerosol dusting aids, and aerosol adhesives (if not postponed) go into effect on January 1, 1997.

II.

TECHNICAL ASSESSMENT

A. INTRODUCTION

This chapter assesses the progress manufacturers have made toward meeting the future effective standards for fabric protectants and aerosol dusting aids and the upcoming standard for automotive brake cleaners.

B. FABRIC PROTECTANTS

Product Description:

As defined in the consumer products regulation, fabric protectants are products designed to be applied to fabric substrates to protect the surface from soiling from dirt and other impurities or to reduce absorption of water into the fabric fibers. The fabric protectant category does not include silicone-based products whose function is to provide water repellency. Nor does it include products which are solely designed for use on fabrics which are labeled "for dry clean only" and sold in containers of 10 fluid ounces or less.

Fabric protectants are used for a variety of applications. Separate products exist for clothing, fine fabrics such as silk and wool, outdoor equipment such as tents, and furniture and carpeting. Fabric protectants are applied to the fabric which is to be protected and allowed to dry. Upon drying, a film is left behind which forms a barrier between the fabric and soil. Fabric protectants are available in liquids, pumps, and aerosols.

Fabric protectants can be classified into two categories: products based on fluoropolymers and products based on siloxanes. Products containing fluoropolymer resin are designed primarily to prevent solid soils from adhering to the fabric. Siloxane products provide some protection from soil and dirt, but their primary purpose is to repel water (silicone-based products designed solely as water repellents are not included in the fabric protectant category).

History:

The Air Resources Board (ARB) adopted standards limiting the VOC content of fabric protectants in 1992 as part of the second phase of the consumer products regulation rulemaking (ARB, 1991). Two tiers of standards were adopted. The first tier set a standard for fabric protectants at 75 percent by weight, effective on January 1, 1995. The second tier VOC standard is 60 percent by weight, with an effective date of January 1, 1997. This technical assessment characterizes the progress made by manufacturers in reformulating products to meet the second tier standard.

Based on the 1990 consumer products survey, the majority of fabric protectants available

in 1990 met the January 1, 1995, 75 percent VOC standard. In 1990, many products used 1,1,1-trichloroethane (TCA) as the principal solvent as it had been exempted from the VOC definition in the consumer products regulation due to its negligible photochemical reactivity. However, we were aware at the time that TCA was being phased out as an ozone depleting substance under federal law (TCA could not be produced after December 31, 1995). We anticipated that VOC solvents would replace TCA for most products. As a result, the first and second tier standards were designed to reduce the amount of VOCs used in fabric protectants. The proposed standards were expected to result in the increased use of waterborne formulations and exempt VOC solvents.

In the 1991 technical assessment, the VOC emissions from fabric protectants were estimated to be approximately 0.2 tons/day in 1990. Organic compounds exempt from the VOC definition emitted an estimated additional 1.2 tons/day in 1990. Since TCA was the one primary exempt organic compound used in fabric protectants, manufacturers have replaced it with alternative compounds (including VOCs, LVPs, and water) since the 1990 consumer products survey. Therefore, the current emissions from fabric protectants may be higher than 0.2 tons per day. In 1990, aerosol fabric protectants accounted for 62 percent of the total market and 24 percent of the emissions, while liquids and pumps accounted for 38 percent of the market and approximately 76 percent of the emissions.

Current Status of Reformulation Efforts:

To assess the current status of manufacturers' reformulation efforts, the ARB staff recently contacted 31 of the 36 manufacturers or distributors of fabric protectants which submitted registration data in 1990. According to the ARB's 1990 survey, 76 fabric protectants were reported as being sold in the California market. Of those 76 products, 65 complied with the future effective 1997 standard.

In our telephone survey, we asked manufacturers and distributors (who represent manufacturers) several questions to assist us in assessing their progress towards meeting the 60 percent VOC standard. Manufacturers were questioned regarding the following: 1) their efforts to reformulate their products for the 1997 standard, 2) the technology they are planning to use to develop a lower-VOC product, 3) what challenges they have to overcome to develop a complying product ready for sale on January 1, 1997, 4) any reformulation concerns they may have, and 5) the status of TCA use in their products.

The responses indicated that the majority of manufacturers and distributors representing manufacturers currently meet the January 1, 1997, 60 percent VOC standard for fabric protectants. Of the 31 manufacturers and distributors contacted, the majority have products already at or below the VOC standard, without the use of TCA. Some manufacturers that are reformulating indicated that their sales in California are minor and, therefore, reformulating their product for a limited market may not be economically justifiable. The eleven manufacturers and distributors who are no longer in the fabric protectant market either no longer manufacture fabric protectants or do not presently distribute them in California.

Based on the information from those manufacturers contacted in 1996, and using the sales

data from the 1990 ARB survey, 72 percent of the fabric protectant market (by weight) currently meets the 60 percent VOC standard effective on January 1, 1997. If those products that are currently being reformulated to meet the standard are also included, 89 percent of the market will meet the 60 percent VOC standard by January 1, 1997. While we recognize from our discussions with manufacturers that the market has changed somewhat since the 1990 ARB survey, we believe our estimates provide a good indication of the market status. Those manufacturers with compliant products sell their products in the industrial, institutional, and household markets.

According to our discussions with manufacturers, they are using fluoropolymer resins, developing new resins, and optimizing the spray characteristics and flow rate of their dispensing systems to develop efficacious, 60 percent VOC water-based products. Manufacturers of solvent-based products use either siloxane or fluoropolymer resins as the active ingredient. To produce an efficacious 60 percent solvent-based product, these manufacturers are limiting the VOCs by using low vapor pressure compounds or are investigating the use of volatile methyl siloxanes. According to our discussions with manufacturers, 60 percent VOC products are available in both the retail and consumer applied sectors. Most of the manufacturers we contacted believe that their 60 percent product is as efficacious as their 75 percent VOC product. Manufacturers are using standardized tests to determine the efficacy of their products. This testing consists of taking swatches of carpet or material, treating the swatches with different amounts of fabric protectant, applying soil, and determining the amount of graying of each swatch by comparing it to a standardized swatch scale.

The main hurdle that manufacturers most need to overcome in reformulating products is the increased dry time. Manufacturers have found that optimizing the flow rate and spray characteristics for water-based products prevents rusting of metal components on the objects being treated. Another concern that a few manufacturers have expressed is the increased cost of the reformulated product. Some manufacturers of solvent-based fabric protectants believe the cost of fabric protectants will increase by 20 to 40 percent, while most manufacturers of water-based products believe that cost is not an issue because water will replace the more expensive organic solvents in water-borne formulations. Additionally, cost is not a factor in many cases as some fabric protectants complied with the standard prior to the adoption of the consumer products regulation. Although some manufacturers believe the cost of their products will increase, we have identified manufacturers that do not expect price increases.

One manufacturer has expressed additional concerns with both their water-based and solvent-based formulations. Concerns regarding the water-based product include buttons and zippers rusting, fabric shrinking, fabric dyes bleeding, and freeze-thaw stability during storage and shipping. This manufacturer's comments on their solvent-based low-VOC product include concerns regarding the possibility of the resin settling out of solution and also freeze-thaw stability during storage and shipping. The other manufacturers and distributors we talked with did not describe problems with shrinkage, bleeding or freeze-thaw stability.

Findings:

The 60 percent VOC limit for fabric protectants, scheduled to become effective on

January 1, 1997, appears to be technologically and commercially feasible. Fabric protectant manufacturers can formulate efficacious products that meet the 60 percent VOC level using a variety of technologies. Based on our discussions with manufacturers, the 60 percent VOC products are already available, and 89 percent of the market can comply with the 60 percent VOC standard by January 1, 1997. We believe that the consumer market demand for fabric protectants in 1997 can be met with a 60 percent VOC product.

C. AEROSOL DUSTING AIDS

Product Description:

As defined in the consumer products regulation, aerosol dusting aids are products designed to assist in removing dust and other soils from floors and other surfaces without leaving a wax or silicone based coating. Aerosol dusting aids do not include products which consist entirely of compressed gases for use in electronic or other specialty areas.

Aerosol dusting aids are sprayed on dust cloths or dust mops to increase the ability of the cloth or mop head to attract and hold dust particles. In addition, aerosol dusting aids may be sprayed directly on a surface for subsequent cleaning. Some aerosol dusting aids are also labeled for use on furnace or air conditioning filters to improve their collection efficiency. According to information provided by industry, the efficacy of these products derives from the ability of the oils in these products to attract dust to the cloth or mop head. When used for dusting floors, some products must be allowed a period of time after they are applied to the cloth or mop head to penetrate and diffuse throughout the dust mop strands. This prevents excess product from leaving a slippery residue on floors. When these products are used as cleaners, they are sprayed directly on the surface to be cleaned.

History:

The ARB adopted standards limiting the VOC content of aerosol dusting aids in 1992 as part of the second phase of the consumer products rulemaking. Two tiers of standards were adopted. The first tier set a VOC standard for aerosol dusting aids at 35 percent by weight, effective on January 1, 1995. The second tier VOC standard is 25 percent by weight, with an effective date of January 1, 1997. This technical assessment is to characterize the progress made by manufacturers in reformulating products to meet the second tier standard.

Based on the data reported in the TSD for the consumer products regulation (ARB, 1991), VOC emissions from aerosol dusting aids were estimated to be approximately 0.5 tons/day in 1990. Liquids and aerosols were the only forms reported, with aerosols accounting for 97 percent of the emissions from dusting aids. According to the October 1991 TSD, nine of the 35 aerosol dusting aid products reported to the ARB met the 25 percent VOC standard.

While VOC standards were determined to be technologically and commercially feasible at the time of adoption, the ARB established some standards with future effective standards in recognition of the fact that reformulation may be challenging for some manufacturers. Aerosol dusting aids was one of the categories warranting a future effective standard. While aerosol

dusting aids accounted for the majority of the VOC emissions from dusting aids in 1990, products with less than 25 percent VOCs were on the market in 1992 when the standard for aerosol dusting aids was adopted. The presence of lower-VOC products already on the market demonstrated that additional emission reductions were commercially and technologically feasible.

In 1992, the ARB staff determined that there were options available to limit the VOC content of aerosol dusting aids. For example, many of the active ingredients were either exempt or low vapor pressure compounds. The main sources of emissions were the VOC solvents and propellants. Some of the options for lowering the VOC content of these products were to replace some of the solvents with water and substitute the hydrocarbon propellant with compressed air or other non-VOC propellants.

Current Status of Reformulation Efforts:

To assess the current status of manufacturers' reformulation efforts, the ARB staff recently contacted 25 manufacturers or distributors of aerosol dusting aids. These manufacturers or distributors represent 100 percent of the California market based on the 1990 ARB consumer products survey. According to that survey, 35 aerosol dusting aid products were reported as being sold in the California market. Of those 35 products, nine products complied with the future effective 1997 standard.

In our telephone survey, we asked manufacturers and distributors several questions to assist us in assessing their progress. We asked manufacturers the following questions: 1) their efforts to reformulate their products, 2) the technology to be used when developing lower-VOC formulations, 3) the most important physical properties or parameters to consider to maintain performance, 4) when they will have formulations available in 1997 to comply with the 25 percent VOC standard, and 5) the cost impacts associated with their product reformulation.

The responses indicated that the majority of manufacturers and distributors are well on their way to reformulating products to meet the 25 percent VOC standard. However, some manufacturers are reviewing their sales volume to determine if it is economically justifiable for them to reformulate based on their limited market in California. Seventeen companies plan to have complying products in the marketplace in 1997. The eight manufacturers or distributors that are no longer in the aerosol dusting aid market either opted not to reformulate for the California market or discontinued their products.

According to our discussions, manufacturers in the process of reformulating are using a variety of techniques. Some of these strategies are to increase the water content while keeping the active ingredients in solution by adding emulsifying agents, using LVP-VOC or exempt solvents, or switching to non-VOC propellants. Manufacturers indicate that their biggest hurdle is to maintain the efficacy of the products. When questioned regarding costs associated with reformulating, many manufacturers indicated that they do not expect reformulation costs to be significant because they are increasing the water content of the product to comply. Others believe costs may increase by 30 percent.

Based on the information from manufacturers contacted in 1996 and using the sales data from the 1990 ARB survey, 99 percent of the aerosol dusting aid market (by weight) currently meets or is in the process of reformulating to meet the 25 percent VOC standard effective on January 1, 1997. While we recognize from our discussions with manufacturers that the market has changed since the 1990 ARB survey, we believe our estimates provide a good indication of the market status. Those manufacturers who already have compliant products for 1997 sell their products in both the industrial and institutional and household markets.

Findings:

Given that a large percentage of the market already complies with the 25 percent standard and that many others are in the process of reformulating using complying technologies, we believe that manufacturers will meet the 25 percent VOC standard. Therefore, the consumer market demand for aerosol dusting aids will be met in 1997.

D. AUTOMOTIVE BRAKE CLEANERS

Product Description:

As defined in the consumer products regulation, automotive brake cleaners are products designed to remove oil, grease, brake fluid, brake pad dust, or dirt from motor vehicle brake mechanisms. Brake cleaners are sprayed onto brake parts before or after disassembly where they dissolve contaminants and drip off, or are wiped away from, the brake parts. According to the 1990 consumer products survey, aerosol brake cleaners account for an estimated 95 percent of the market, with liquid products accounting for the remaining 5 percent of the market. Many of the liquid brake cleaners are poured into pump spray containers by the consumer or are sprayed out by other means.

History:

The ARB adopted a 50 percent VOC standard for brake cleaners in 1992 as part of the second phase of the consumer products rulemaking. The standard is scheduled to become effective on January 1, 1997. The ARB established a future effective 1997 VOC standard (instead of a 1995 VOC standard) for brake cleaners to provide additional time for manufacturers to develop complying formulations. Although 89 percent of the aerosol brake cleaner market, and 90 percent of the liquid brake cleaner market, already complied with the 50 percent VOC limit at the time of adoption, most of the complying products contained the exempt solvent 1,1,1-trichloroethane (TCA). As noted earlier, TCA production has since been phased out by the U.S. EPA due to its ozone depleting potential, requiring manufacturers to find other means of meeting the 50 percent VOC standard. At the time of the Phase II consumer products rulemaking, ARB staff recognized that TCA would eventually become unavailable to brake cleaner manufacturers and pointed out that there were alternatives to TCA-based products such as water-based technologies that were currently being marketed.

Based on data from the 1990 consumer products survey, brake cleaners accounted for an estimated 0.8 tons/day of VOC emissions in 1990 (ARB, 1991). In addition, organic compounds

exempt from the VOC definition accounted for an estimated 2.65 tons/day of emissions. Since TCA was one of the primary exempt organic compounds used in brake cleaners, manufacturers have replaced it with alternative compounds (including VOC's) since the 1990 consumer products survey. Therefore, the current VOC emissions from brake cleaners may be much higher than 0.8 tons/day.

Current Status of Reformulation Efforts:

To assess the current status of manufacturers' reformulation efforts, the ARB staff recently contacted 54 manufacturers or marketers of brake cleaners. These manufacturers or marketers represent 89 percent of the California market based on the 1990 consumer products survey. In our telephone survey, we asked manufacturers and marketers the following questions to assist us in assessing their progress toward the 50 percent VOC standard for brake cleaners: 1) their efforts to reformulate their products, 2) the technology to be used when developing lower VOC formulations, 3) the most important physical properties or parameters to consider to maintain performance, 4) when they will have formulations available to meet the 50 percent VOC standard, and 5) the cost impacts associated with their product reformulation.

Based on the information from manufacturers contacted in 1996 and using the sales data from the 1990 ARB survey, 27 percent of the automotive brake cleaner market (by weight) currently meets the 50 percent VOC standard effective on January 1, 1997. If those products that are currently being reformulated to meet the standard are also included, 89 percent of the market (by weight) will meet the 50 percent VOC standard by January 1, 1997. However, some manufacturers are reviewing their sales volume to determine if it is economically feasible for them to reformulate their product and may decide to stop selling their product in California.

Based on our telephone survey, there appear to be two distinct types of formulations available: chlorinated and nonchlorinated (including water-based) products. Many manufacturers offer both types, because each offers distinct advantages to the consumer. Chlorinated products are generally nonflammable but may have warning labels due to the potential toxicity of the chlorinated compounds used. On the other hand, traditional nonchlorinated products may be flammable but do not contain chlorinated compounds. As such, the reformulation efforts for each type of product will be discussed separately.

For chlorinated products, the status of perchloroethylene is a key issue. Perchloroethylene is currently considered to be a VOC by the ARB. However, the U.S. EPA has recently exempted perchloroethylene as a VOC, and the ARB is proposing to exempt it in this report. Based on our telephone survey, most manufacturers will have no problems manufacturing a chlorinated brake cleaner product if the ARB exempts perchloroethylene, because many brake cleaners already contain perchloroethylene. In most cases, perchloroethylene is the primary compound used to replace TCA. If perchloroethylene replaced all the TCA (one-to-one basis) that was previously used in brake cleaners, 81 percent of the brake cleaner market (by weight) will comply with the 50 percent VOC standard (using sales data from the 1990 ARB survey). Based on this estimate, we do not expect a significant increase in the use of perchloroethylene if it is exempted. Although some products currently meet the 50 percent VOC limit with the use of methylene chloride, manufacturers have cited its toxicity and high cost as concerns.

For nonchlorinated products, one option is to formulate to a water-based product. Water-based products typically contain several solvents in conjunction with water and hydrocarbon propellants. Although there are currently water-based brake cleaners on the market that meet the 50 percent VOC standard, many members of the industry have commented that they cannot formulate an efficacious water-based product. Typical complaints are that they do not clean as well and take too long to dry.

Another reformulation option for nonchlorinated products is to use acetone, which is exempt from the VOC definition. Many manufacturers in the telephone survey indicated that they planned to use acetone to formulate a nonchlorinated product. Some manufacturers in the telephone survey expressed concerns that acetone could degrade elastomeric brake components. However, follow-up telephone conversations with these manufacturers indicated that they did not have any data indicating that this would occur.

To determine if acetone could damage elastomeric materials or other brake components, ARB staff contacted automotive manufacturers, brake manufacturers, and acetone suppliers. Damage to elastomeric components or other brake components is unlikely during the brief exposure of these parts during brake cleaning operations according to our contacts. The primary elastomeric material used in brake components, ethylene propylene diene monomer (EPDM) is very resistant to acetone. In fact, according to chemical compatibility information supplied to ARB staff, EPDM is more resistant to acetone than many other solvents currently used in brake cleaners (Shell Chemical Company, 1996; Cole-Parmer Instrument Company, 1996). In addition, acetone is currently used in many brake cleaners, although not at the levels that may be used to meet the 50 percent VOC standard.

Other concerns raised about acetone during the telephone survey were its flammability and odor. However, nonchlorinated brake cleaners in general contain highly flammable materials such as toluene, methyl ethyl ketone, petroleum distillates, and hydrocarbon propellants. Many of these solvents also have strong odors. (It should also be pointed out that acetone is the primary ingredient in traditional nail polish removers).

A third option for a nonchlorinated formulation is the use of low vapor pressure (LVP) solvents. However, according to our telephone survey, most manufacturers currently do not expect to utilize this option. Key concerns are the relatively high cost of these materials, slow dry-time, and a tendency for these compounds to leave a residue on brake parts.

Findings:

The 50 percent VOC limit for automotive brake cleaners, scheduled to become effective on January 1, 1997, appears to be technologically and commercially feasible. Brake cleaner manufacturers can formulate products that meet the 50 percent VOC level using a variety of technologies. The most promising options are those using perchloroethylene (if exempted as a VOC), products using acetone, and water-based products. Perchloroethylene is already widely used in brake cleaners. However, if perchloroethylene is not exempted as a VOC brake cleaner manufacturers may have trouble formulating a complying chlorinated brake cleaner. Therefore, if perchloroethylene is not exempted as a VOC, the 50 percent VOC standard would have a greater

impact on the industry. Nevertheless, the standard would still be feasible because other alternatives to using perchloroethylene exist.

References:

Air Resources Board, Staff Report and Technical Support Document - Proposed Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products, August, 1990.

Air Resources Board, Staff Report and Technical Support Document - Proposed Amendments to the Statewide Regulation to Reduce Volatile Organic Compound Emissions from Consumer Products - Phase II, October, 1991.

Cole-Parmer Instrument Company, Chemical Resistance Database, Cole-Parmer Internet Site; http://www.coleparmer.com/chemcomp, July 1, 1996.

Shell Chemical Company, Facsimile to ARB Staff, June 4, 1996.

III.

DESCRIPTION AND TECHNICAL BASIS FOR THE PROPOSED AMENDMENTS

A. INTRODUCTION

This chapter provides a description of the proposed amendments to the aerosol adhesives standard and the technical discussion of the proposed amendments. Also included is a description and the technical basis for the additional proposed amendments. This includes amendments clarifying definitions and provisions in the consumer products regulation and the amendments to the VOC definition in the consumer products and aerosol coatings regulations.

B. AMENDMENT TO THE AEROSOL ADHESIVES STANDARD

Description of the Amendment:

This proposed amendment would amend the Table of Standards to extend the effective date of the 25 percent VOC standard for aerosol adhesives from January 1, 1997, to January 1, 2002, a five-year extension. Based on current survey results and discussions with aerosol adhesive manufacturers**,** it appears that industry cannot achieve the 25 percent VOC standard by the current effective date of January 1, 1997. We have made this determination because those in the market that can comply are only able to do so with a toxic air contaminant-based technology, which is not viable for many of the affected products. The one available technology for aerosol adhesives requires reformulation with methylene chloride, which has been identified by the ARB as a toxic air contaminant. The products than can comply through the use of methylene chloride are a small portion of the market. Additionally, methylene chloride is not suitable for all substrates. For example, methylene chloride can attack polystyrene foam substrates. This is an issue because aerosol adhesives are commonly used with polystyrene foam substrates in the arts and crafts market. Finally, many manufacturers have corporate policies against its use due to health concerns. Because of these factors, we do not believe it is appropriate to maintain the effective date of the standard and place manufacturers in the position of having to rely upon this single technology which requires use of a toxic air contaminant.

Despite some manufacturers' concerns about product performance in some applications, some manufacturers have indicated that they may use methylene chloride to comply with the 25 percent VOC standard if it becomes effective next January as scheduled. It was not our intention to rely upon the exclusive use of methylene chloride when the 25 percent standard was adopted by the Board in 1990. At the time of adoption, it was understood that there were other promising technologies. Therefore, we recommend that an additional five years for continued research and development be allowed to enable manufacturers to explore reformulation options that do not rely exclusively upon the use of methylene chloride. Also, under the proposal, the Reporting Requirements section would be amended to require industry to provide data, by March 31, 1999, regarding product sales and composition for the year 1998 as well as a written update of their research and development efforts. The Board would hold a public hearing in the year 2000 to

review and consider any appropriate modifications to the 25 percent VOC standard.

Product Description:

Aerosol adhesives are adhesives that are dispensed by means of a propellant or mechanically induced force. As defined in the consumer products regulation, household adhesives are products that are used to bond one surface to another by attachment. Household adhesives also do not include units of product, less packaging, which weigh more than one pound or consist of more than 16 fluid ounces. (Note: the proposed modification to the definition of "household adhesive" would eliminate the word "household").

Aerosol adhesives are used in the consumer market for a variety of applications including arts and crafts, photographic mounting and graphic layout, automobile maintenance (headliners and trim), and bonding decorative laminates. They are formulated to produce one of two basic spray patterns: particle sprays and lace sprays. The majority of aerosol adhesives are particle sprays.

Particle sprays produce a uniform pattern of discrete particles. Lace sprays (often called web sprays) produce a lace-like or cobwebby pattern, with very little atomization. Lace sprays are used for precise placement of the adhesive with little or no overspray. In general, lace sprays are claimed to produce high strength, permanent bonds, while particle sprays are used for lightweight materials and repositionable as well as permanent bonding.

History:

The ARB adopted standards limiting the VOC content of aerosol adhesives in 1992 as part of the second phase of the consumer products rulemaking. Two tiers of standards were adopted. The first tier set a VOC limit of 75 percent by weight, effective January 1, 1995. The second tier standard is 25 percent VOC by weight, with an effective date of January 1, 1997.

The Board determined that the 25 percent standard was both commercially and technologically feasible at the time of its adoption. The Board did, however, acknowledge the difficulties in meeting the 25 percent standard and determined that aerosol adhesives manufacturers should be allowed extra time (until January 1, 1997, or six years from the date of adoption) to develop low-emitting aerosol adhesives to meet the 25 percent VOC standard.

This technical assessment evaluates manufacturers' progress towards meeting the second tier standard. Based on the data reported in the Technical Support Document (TSD) for Phase II of the consumer products regulation (ARB, 1991), VOC emissions from aerosol adhesives were estimated to be approximately 0.4 tons/day in 1990. Aerosol adhesives represented 35 percent of the total emissions from the adhesives category. Three aerosol adhesives met the 25 percent standard at the time of its adoption.

In the 1991 TSD, the ARB staff identified several options for reformulating aerosol adhesives to limit the VOC content, including reformulating with water or exempt solvents, increasing the resin content, and developing innovative adhesives with improved transfer

efficiency and reduced spray rate.

In early 1995, we first became aware that at least one manufacturer, the 3M Company, was having difficulty reformulating their products to meet the 25 percent future effective standard (3M Company, March 1995). According to 3M Company, a prototype water-based product had been developed and test marketed, but the product had a number of technical problems.

Process for Gathering Data:

In evaluating this category, we compiled information from the 1990 consumer products registration database, held meetings and teleconferences with industry, conducted a survey of manufacturers, and made follow-up telephone calls. There is very little information about aerosol adhesives in trade journals, books, and the technical literature. We also did not find any patents relating to aerosol adhesives.

To assess the status of reformulation efforts toward achieving the 25 percent standard, we conducted a survey of aerosol adhesive manufacturers. The survey was developed with the Adhesive and Sealant Council and representatives of the 3M Company, DAP, Inc., Loctite Corporation, Wilsonart International, Sherwin-Williams, and the Ventura County Air Pollution Control District. The survey recipients included the 18 aerosol adhesives manufacturers in the consumer products registration database, plus additional manufacturers known to sell products in California.

In our survey, we asked manufacturers to report the following information for each product: 1) 1995 California sales, 2) spray type (particle or lace), 3) percent by weight VOC, 4) the name and percent by weight of each exempt compound, low vapor pressure (LVP) compound, non-carbon containing compound, and propellant, 5) if perchloroethylene is used in the formulation, 6) the lowest potential VOC content achievable through reformulation, and 7) how the product is used and any special performance requirements it must satisfy. A copy of the survey may be found in Appendix C-1.

We also conducted follow-up telephone conversations with the survey respondents. In these conversations, we asked additional questions regarding the following: 1) their efforts to reformulate aerosol adhesives, 2) the technology to be used when developing lower VOC formulations, 3) the most important physical properties or parameters to consider to maintain performance, 4) if they could not meet the 25 percent standard, what constraints had kept them from doing so, 5) what alternative limits they believed were achievable, and 6) the cost impacts associated with product reformulation.

In addition, the 3M Company provided valuable information on their experiences in developing low-VOC aerosol adhesives. We met with 3M Company representatives on March 22 and September 26, 1995 and on January 17, May 22, June 6, and September 3, 1996.

Current Status of Reformulation Efforts:

1. Survey Results

We received responses from 21 out of the 25 manufacturers surveyed. Ten companies reported 1995 California sales. Eleven companies reported no California sales in 1995; however, four of these companies provided useful information on their products. Altogether, survey responses were received from companies representing over 90 percent of the sales reported in the consumer products registration database, plus additional companies new to the California market. The information presented here is summarized from manufacturers' confidential responses to the survey. A non-confidential summary of the survey responses may be found in Appendix C-2.

A total of 45 products were reported in the survey, with particle sprays representing approximately 90 percent of the total market share of reported products. The VOC content ranged from a low of 25 percent to a high of 89 percent.

Fourteen products, approximately 25 percent of the market, were formulated with methylene chloride in concentrations ranging from 25 to 75 percent by weight of the total formulation. These products ranged from 22 to 58 percent VOC, with a sales-weighted average VOC content of 27 percent. Four of the products (three of them particle sprays) meet the 25 percent standard.

The 31 products formulated without methylene chloride (almost 75 percent of the market), ranged from 58 to 89 percent VOC, with a sales-weighted average VOC content of 83 percent. Acetone was used as a solvent in 17 of these products in concentrations ranging from four to 25 percent by weight of the total formulation. No water-based products or products containing perchloroethylene were reported. VOC solvents were not speciated in the survey.

The propellants reported included propane and propane/isobutane or n-butane blends, dimethyl ether (DME), and DME/hydrocarbon blends. They typically constitute 25 to 30 percent by weight of the formulation, but concentrations can range from less than 15 to 55 percent by weight. The use of hydrofluorocarbon HFC-152a, compressed gases, or propellantless systems was not reported.

Low vapor pressure (LVP) compounds, ranging from one to 25 percent by weight, were reported as resins, polymers, rubber, antioxidants, and rosin.

2. Manufacturer Contact Summary

We conducted follow-up telephone conversations with the survey respondents and other manufacturers to further ascertain the status of their reformulation efforts. Based on these conversations, it is our understanding that there are a number of approaches to reformulating lower VOC products: formulating with water, formulating with acetone, formulating with methylene chloride, using non-VOC propellants, increasing the functional adhesive component of the product, and using barrier package technology. None of the companies contacted believed

that the 25 percent standard was currently achievable without the use of methylene chloride, which is against corporate policy for approximately half of these companies. Several companies using methylene chloride either had concerns about continuing its use or preferred to maintain a variety of products with different formulations in the marketplace.

A number of manufacturers have tried to develop water-based aerosol adhesives in the past without success. Health (toxicity) and safety (flammability) concerns have largely driven this effort. Reported problems with water-based products include slow drying times, resin incompatibility, freeze-thaw instability, insufficient adhesion, wrinkling of paper substrates, and staining of textiles. Several manufacturers are continuing to invest in research and development for water-based products, and prototype products are actually in the market. However, breakthroughs are still needed to overcome product stability and performance problems, in addition to consumer education on the proper use of these products.

Replacing the VOC solvents in aerosol adhesives with acetone is another reformulation option. In September 1995, the ARB exempted acetone from the VOC definition in the consumer products regulation (ARB, 1995). Several manufacturers stated that acetone has limited solubility for the adhesive resins and polymers, and that VOC cosolvents would need to be added to the formula to achieve atomization. A few manufacturers have invested resources in acetone reformulation, but the majority of manufacturers have not yet done so.

An issue that has arisen with acetone is substrate attack. One manufacturer has reported that the increased acetone in one of their prototype products degrades polystyrene foam substrates. While most manufacturers agreed that acetone would attack polystyrene substrates, none could estimate what an acceptable upper formulation limit might be. We note that there are several products on the market with up to 20 percent acetone in the formulation that are labeled for use on polystyrene foam.

Other problems reported with acetone include insufficient adhesion, reduced transfer efficiency (misting), and a shortened shelf-life. However, one manufacturer is continuing to investigate acetone reformulation as a means of achieving the 25 percent standard. A few manufacturers also expressed concern about the flammability of acetone, citing increased insurance costs and liability. However, others noted that their product was already highly flammable regardless of the acetone used in it.

Methylene chloride, also an exempt solvent, is currently used in 14 aerosol adhesives, representing over 25 percent of the total market share. Most industry representatives indicated that methylene chloride is a good, fast drying solvent which is more compatible than acetone with the other components of an aerosol adhesive system. However, it is not an option for some companies because of its toxicity. According to some sources, chlorinated solvents such as methylene chloride also attack polystyrene foam substrates. Other sources stated that products formulated with up to 50 percent methylene chloride did not degrade polystyrene foam.

Perchloroethylene is not currently used in any of the aerosol adhesives surveyed. According to one manufacturer, perchloroethylene is too slow in evaporating to be of practical use in an aerosol adhesive. It also raises the same health concerns as does methylene chloride,

and reportedly would also attack polystyrene substrates.

HFC-152a, a non-VOC propellant, is another option for reducing the VOC content of aerosol adhesives. Currently manufactured solely by DuPont, HFC-152a is being used in prototype water-based products and has been investigated as a substitute propellant in solvent-based formulations. However, due to its poor solvency, there are apparent stability problems resulting in product coagulation and actuator clogging. HFC-152a also involves cost increases. Nonetheless, a number of companies are considering its use. When asked about the solvency limitations of HFC-152a, a DuPont representative stated that they have not explored polymer dependent categories, such as adhesives, because they are highly specialized and represent a small segment of the market (DuPont, 1996). The representative acknowledged that HFC-152a is a mild solvent and that cosolvents would improve its solvency.

Other possibilities for lowering the VOC content of aerosol adhesives are increasing the functional adhesive content of the formulation, or using alternative dispensing forms such as barrier packages (at least one manufacturer is investigating such a product).

Findings:

Based on the survey results and our follow-up telephone conversations, there are four products on the market that meet the 25 percent VOC standard, all of which use a single technology that relies on the use of a toxic air contaminant. None of the other products currently on the market will be able to meet the 25 percent VOC standard by January 1, 1997, unless they use the one technology presently available, a technology which requires reformulation with methylene chloride, which has been identified by the ARB as a toxic air contaminant. This technology is not viable for many of the affected products.

A number of regulatory agencies have taken action on methylene chloride. In 1988, methylene chloride was added to the Proposition 65 list of "Chemicals Known to the State to Cause Cancer" (Safe Drinking Water and Toxic Enforcement Act of 1986). The ARB identified methylene chloride as a toxic air contaminant, with no identified threshold for cancer, through its Assembly Bill 1807 process in 1989 (ARB, 1989). Methylene chloride has also been identified as a hazardous air pollutant pursuant to section 110(b) of the federal Clean Air Act Amendments of 1990 [42 U.S.C. Section 4712(b)]. Methylene chloride has a United States Environmental Protection Agency (U.S. EPA) weight of evidence classification of B2 (probable human carcinogen) (U.S. EPA, 1993). Finally, the Occupational Safety and Health

Administration is proposing to reduce the 8-hour time-weighted average permissible exposure level (PEL) for methylene chloride from 500 ppm to 25 ppm (published in 56 FR 54462; 60 FR 62360).

In the aerosol coatings regulation (ARB, 1995), methylene chloride is included in the VOC calculation to discourage its increased use. This is because it has properties that make it an appealing solvent for manufacturers to consider when reformulating aerosol coatings. Some manufacturers indicated that they would use methylene chloride to comply with the proposed standards. When the 25 percent VOC standard for aerosol adhesives was adopted in 1992,

manufacturers were just beginning to investigate the development of water-based products. It was believed that compliance with the standard would be achieved through this approach rather than through the increased use of methylene chloride. Even now, when water-based technology does not appear promising, many manufacturers are reluctant to use or increase the use of methylene chloride in their products because of health concerns. Some companies have corporate policies that prohibit the use of any chlorinated solvent in their products. Even companies currently using methylene chloride prefer to maintain a variety of products with different formulations in the marketplace. In addition, according to some manufacturers, methylene chloride may not be suitable for all applications.

If the 25 percent VOC standard becomes effective on January 1, 1997, as scheduled, virtually all of the current products, representing almost 90 percent of the market share, could not be sold in California. However, some manufacturers could decide to reformulate their products with methylene chloride to maintain a presence in the market. We do not wish to encourage increased public exposure to methylene chloride. At the same time, we have a State Implementation Plan (SIP) commitment to achieve a 0.2 ton/day reduction in VOC emissions from the aerosol adhesives category (see below).

Through our technology assessment, we conclude that aerosol adhesives manufacturers need more time to develop additional technologies to achieve compliance with the 25 percent VOC standard. Water-based products have been developed but have technical and consumer acceptance problems. Breakthroughs will be needed to overcome these problems. We have recently become aware of a European directive regarding the flammability and safety of aerosols, which is driving the efforts of at least one manufacturer to continue to invest in research and development for water-based products (3M Company, 1996).

With the recent exemption of acetone from the VOC definition, some manufacturers have developed acetone reformulated products. Some manufacturers have experienced technical problems, but at least one manufacturer is continuing to try different formulations in an attempt to meet the 25 percent standard. The majority of manufacturers have not yet pursued acetone reformulation. Finally, there is the possibility of using innovative products with increased resin content or slower delivery rates, barrier packaging technology, and alternative product forms for certain applications.

Regarding the cost to reformulate aerosol adhesives to meet the 25 percent VOC standard, some manufacturers have invested significantly in research and development over the past five years. Others have invested considerably less or are relying on their suppliers to develop new products. Almost half have withdrawn from the California market. None of the manufacturers contacted could provide an estimate of the cost to produce a compliant product.

Recommendation:

Recognizing that some manufacturers have invested significant research funds towards developing low-VOC products and to allow manufacturers more time to investigate additional reformulation options, we recommend that the Table of Standards be revised to extend the date of the 25 percent VOC standard from January 1, 1997, to January 1, 2002. This extension would

allow an additional five years for continued research and development.

To enable the ARB staff to assess aerosol adhesives manufacturers' progress toward achieving the 2002 standard, and to monitor the use of methylene chloride in the product formulations, we recommend that the Reporting Requirements section be amended to require the following information to be submitted by March 31, 1999:

1) data regarding product sales and composition for the year 1998, including that information listed in section 94513(a) and other information necessary to determine the emissions from aerosol adhesives; and

2) a written update of the research and development efforts undertaken to achieve the January 1, 2002, VOC limit. The written update will include detailed information about the raw materials (solvents, propellants, resins, and polymers) and hardware (valves, actuators, cans) used in product reformulation, the testing protocols used, the results of the testing, and the cost of reformulation efforts.

We also recommend that the Board hold a public hearing by June 1, 2000, to review and consider any appropriate modifications to the January 1, 2002, standard for aerosol adhesives. If the information submitted in 1999 shows that the 25 percent VOC limit appears to be infeasible, we would propose any control measures needed to offset a modification to the limit.

State Implementation Plan Issues:

The U.S. EPA approved the Phase II consumer products regulation, including the future effective 25 percent VOC standard for aerosol adhesives, on February 14, 1995. Aerosol adhesives are not a large emission source, with 1990 VOC emissions of 0.4 tons/day estimated in the TSD for the Phase II consumer products rulemaking (ARB, 1991). The second tier reduction is projected to be approximately 0.2 tons/day beginning in 1997. However, districts are relying on very small incremental reductions to help them fulfill their plan requirements. For example, many new local measures in the Sacramento region project emission reductions of approximately 0.1 tons/day in 1999. The ARB is also considering consumer products categories of 0.1 tons/day for regulation under the mid-term measures program.

Postponing the standard for aerosol adhesives or any other standard in the consumer products regulation, without making up the reductions elsewhere, would constitute a "relaxation" of the SIP. Under the federal Clean Air Act, this would be unapprovable by the U.S. EPA. If the ARB approved the postponement even though it was unapprovable under the federal Clean Air Act, the U.S. EPA could bring enforcement action against manufacturers who did not meet the current 25 percent limit in the SIP. In addition, a SIP shortfall would result, and the U.S. EPA could issue a SIP call requiring the ARB to mitigate the loss of emission reductions as a result of the relaxation. Sanctions would eventually be imposed against the state if the ARB did not modify the SIP to make up the emission reductions. Therefore, to address the SIP relaxation issue and avoid the negative repercussions of a SIP relaxation, it would be necessary to replace any "lost" emission reductions. If the 25 percent standard is postponed, the lost emission

reductions would have to be made up in the interim period during which the standard was delayed.

However, we have identified reductions from the first tier standards in the aerosol coatings regulation that may be used to make up the lost emission reductions in the interim. These reductions were not fully claimed in the SIP until the 2002 milestone year, although the reductions are being achieved before then. In 2002, when the total emission reductions are claimed, the 0.2 tons/day emission reduction will have to be achieved by the aerosol adhesives category, or by another consumer product category that will achieve equivalent emission reductions (in excess of our current SIP commitments), to avoid a SIP shortfall. Using this approach, the proposed amendment to the aerosol adhesives does not compromise our ability to meet rate-of-progress requirements or demonstrate attainment.

C. AMENDMENTS TO PROVIDE CLARIFICATION REGARDING DEFINITIONS AND PROVISIONS AND AMENDMENT TO THE CODE-DATE PROVISION IN THE CONSUMER PRODUCTS REGULATION

1. Amend provisions and definitions to enhance clarity and compliance and also improve consistency with the antiperspirant and deodorant regulation

We are proposing to amend several definitions along with minor amendments to correct typographical errors in the consumer products regulation. These amendments include the following: amend the "flying bug insecticide" and "crawling bug insecticide" definitions to clarify that the categories do not apply to certain highly specialized insecticides. The crawling bug definition is being amended to clarify that the insecticide standard does not apply to products which are specifically active against house dust mites. The flying bug definition is being amended to clarify that products acting specifically to protect fabric from damage by moths are not subject to regulation. These changes clarify our original intent in proposing these standards and in no way compromise emission benefits claimed in the SIP. Standards for these specialized categories may be proposed at a later date. We are also proposing to update the "consumer product" definition to reflect recent changes to the definition of consumer products in section 41712 of the California Health and Safety Code. Specifically, we are proposing to add aerosol coatings to the list of products considered "consumer products" in the Health and Safety Code. As the definition of "consumer product" in the consumer products regulation is based on this Health and Safety Code definition, it is appropriate to propose this amendment in response to this recent change.

We are proposing an amendment to the "charcoal lighter material" definition to specifically exempt non-chemically formulated "fat woods" (i.e., naturally occurring high-resin kindling) from the definition. Although consumer products are specifically defined as consisting of only chemically formulated products, there has been some confusion in the past as to whether fat woods are subject to the requirements for charcoal lighter materials specifically and the consumer products regulation generally. This amendment makes it clear that they are not currently subject to the requirements of the consumer products regulation. As a part of this proposed amendment we are adding a definition for "fat woods." Additionally, we are proposing an amendment to make it clear that charcoal lighter materials may not use the exemption for LVP-VOCs to meet the requirement for charcoal lighter material. Rather, they must fulfill the requirements in section

94509(h) "Requirements for Charcoal Lighter Material." This clarification will not affect the current status of exempted charcoal lighter material manufacturers' products.

We are also proposing to rename the "LVP Compound" definition to "LVP-VOC." This amendment is to clarify that LVPs are VOCs as defined in section 94508(a)(90) of the consumer products regulation. A related proposed amendment is to delete the second LVP definition that is included in the "Exemptions" section and to instead refer back to the LVP-VOC definition already included in the "Definitions" section. These are both minor changes intended to clarify these provisions and neither of these proposed amendments will have any impact on the LVP exemption.

Several clarifications are proposed regarding how VOC content is defined and calculated. The Table of Standards sets limits on the VOC content of various consumer products (i.e., the "Percent VOCs by Weight"). The regulation currently specifies a definition of the term "Percent-by-Weight." This definition specifies an equation for calculating the "Percent-by-Weight" of VOCs in a product, for the purpose of determining whether the VOC content of a product is above or below the VOC limit specified in the Table of Standards.

The current language may be confusing, because the regulated community typically views the regulation as restricting the "VOC content" of consumer products rather than "Percent-by-Weight." To improve clarity, we are proposing to eliminate the definition of the term "Percent-by-Weight" and to replace it with the more understandable term "VOC Content." However, some changes must be made to the definition of “VOC content” in order to accommodate ARB Method 310, which is being proposed as a separately-noticed item. If ARB Method 310 is approved by the Board, there will then be two ways to calculate the "VOC Content" of a consumer product: (1) actually testing the product using Method 310, and (2) calculating the VOC content of the product using formulation data obtained from manufacturers’ records.

To clarify that there are two basic ways to determine VOC content, we are proposing to define the term "VOC Content" as :

> "... the total weight of VOC in a product expressed as a percentage of the product weight (exclusive of the container or packaging), as determined pursuant to sections 94515(a) and (b)."

This definition refers to section 94515, the "Test Methods" section of the regulation, which we are also proposing to change. The first change (proposed as a separate Board item) is to specify in section 94515(a) that Method 310 will be used to determine compliance with the regulatory limits. The second proposed change is to take the equation set forth in the old definition of "Percent-by Weight" and move it to section 94515(b), where it will appear under the heading “VOC content determinations using product formulation and records." This second change is appropriate because the equation is really a way to calculate VOC content--without actually testing the product using Method 310 or some other test method--when the product constituents are known from manufacturer's formulation records.

One final change is also being proposed to section 94515(b). As mentioned above, the proposed amendments would provide two ways to determine VOC content. These two ways should yield similar results in the vast majority of cases, but there may be situations in which the results will be different. Such a discrepancy could be caused by a manufacturer's records that are inaccurate for some reason. Inaccuracies could be caused by such problems as clerical errors or by production errors in which too much VOC was accidentally added to a particular batch of product. In the case of such a conflict, we propose to specify in the regulation that the results of Method 310 (i.e., actual physical testing of an individual product sample) take precedence over results that are calculated from manufacturer's records.

An amendment is proposed to the Table of Standards regarding dilution of products. We have become aware that some consumer product labels direct the user to dilute concentrates with VOC solvent, rather than with water or non-VOC solvent. This amendment would address those products that are diluted with VOCs as well as those that are diluted with non-VOC solvents or water. It clarifies that the VOC content must be based on the "after dilution" VOC content, whether the product is diluted with VOC solvent, non-VOC solvent, or water.

We are also proposing to remove from the Table of Standards a reference regarding the sell-through period for consumer products sold in the Bay Area Air Quality Management District (BAAQMD), as the relevant period is past. Because the 18-month sell-through period for those products sold in the rest of California would have expired on July 1, 1994, no products with an effective date of January 1, 1993, that exceed the VOC standard may be sold in California under the sell-through provision. Therefore, the provision is no longer necessary.

An amendment to the "Administrative Requirements" is proposed regarding the defacing of consumer product containers. This proposed amendment clarifies that it is not permissible to remove or make illegible the date or code-date information from any regulated product and also makes the consumer products regulation more consistent with the antiperspirant and deodorant regulation. This proposed amendment would assist in alleviating the concerns that retailers and manufacturers have with diverter companies that purchase products outside of the normal distribution channels and remove dates, code-dates, or batch codes from consumer products. This would allow enforcement against diverters instead of putting legitimate retailers and manufacturers at risk when date or code-dates are removed.

The "Registration" section has been renamed to "Reporting Requirements" to more correctly characterize the requirements of this section. This amendment is proposed to clarify that the "responsible party" (i.e., the company whose name is on the label or for whom the product was made) need only supply registration data upon request. As presently worded, the section can be misinterpreted as indicating the registration data must be submitted yearly and also for new products. Additionally, the words "manufacturer" and "responsible party" are used interchangeably in this section. The proposed amendment to this section replaces the term "manufacturer" with the term "responsible party." This amendment would ensure that the term "responsible party" is used consistently throughout the regulation and would clarify that it is the "responsible party" that must supply the data described in the "Registration" section upon request, not necessarily the manufacturer.

A proposed amendment to the "Test Methods" section would make the provision consistent with the antiperspirant and deodorant regulation and would establish that it is not permissible to modify, change, or fabricate records used in the manufacture of a product to verify compliance.

Miscellaneous proposed amendments to improve the clarity of the regulation include, among other minor changes, reformatting of the equation used to qualify a consumer product as "innovative" and the addition of descriptive headings to some sections.

2. Amend definitions for "household adhesives," "construction and panel adhesives," and "general purpose adhesives," to improve clarity

We are proposing that the term "household" be deleted from the adhesive categories as the regulation was intended to include "industrial and institutional," as well as household adhesives. This change is needed to clarify that industrial and institutional adhesives are subject to the regulation if used to maintain or operate an establishment. The current definition for "construction and panel adhesive" is too restrictive as it unintentionally excludes construction and panel adhesives that are marketed in anything other than 1/10 gallon or 11 fluid ounce containers. Therefore, the size limitation for this category would be deleted from the definition to remove ambiguity.

The current definition for "general purpose adhesive" defines this group of products as adhesives designed for use on a variety of substrates, and as products which are not covered by other adhesives definitions. In response to industry comments, we have added two clauses to this definition to help clarify which adhesives are not for use on a "variety of substrates." First, adhesives made exclusively for use on one specific category of substrate materials (i.e., different types of metals, paper products, ceramics, plastics, rubbers, vinyls, etc.) would not be considered to be general purpose adhesives. For example, an adhesive designed for use only on brass, copper and other metals, but not for use on any other materials like plastic would be a specialty adhesive and would not be covered by the general purpose adhesive definition. Second, adhesives made exclusively for use on one specific category of articles (i.e., gaskets, automotive trim, weather stripping, carpets, etc.) that may be composed of different materials but perform a specific function would not be considered to be general purpose adhesives. For example, an adhesive designed only for bonding automotive trim made of different materials to the various parts of a car where trim is placed would be a specialty adhesive not covered by the general purpose adhesive definition. On the other hand, adhesives used for a variety of purposes on automobiles would be included as general purpose adhesives. Furthermore, a gasket adhesive that bears labeling advising that the product is also suitable for bonding other materials, such as fabrics, would be considered a general purpose adhesive. Specialty adhesives that are not covered by the general purpose adhesive definition or by the other adhesive definitions are not currently regulated by the ARB as consumer products.

3. Amend definition for contact adhesives to streamline product determination process

Background:

The definition for "contact adhesive," as it stands now, refers to formulation ingredients and the technical characteristics of the bonding process. The ARB's Monitoring and Laboratory Division has developed a draft test method to distinguish contact adhesives from other products by testing to determine whether an instantaneous, non-repositionable bond is formed. The method is purely qualitative, and some adhesives may possess properties which the test cannot properly or conclusively classify.

Summary of the Revised Definition:

As is the case with the other adhesive categories, we are proposing to delete the term "household" from the definition for "contact adhesive." The revised definition we are proposing would also streamline the product determination process by eliminating the need for laboratory tests. Products would be identified based on usage instructions found on product labels as well as information contained in other product literature provided by the manufacturer. We would remove the reference to specific formulation types from the definition because we believe that manufacturers may be able to develop contact adhesives using polymers other than those that are nitrile-based, or contain polychlorobutadiene or latex. Finally, the revised definition would be better suited to differentiate between bona-fide contact adhesives and "borderline" products, such as pressure sensitive adhesives, rubber cements, and some general purpose adhesives that exhibit some contact adhesive properties.

Technical Justification for the Revised Definition:

Below is a summary of the technical assessment we undertook to support the revised "contact adhesive" definition we are proposing. The technical assessment was based on conversations with twelve adhesive manufacturers and representatives, including 3M Company, Columbia Cement Company, Elmer's Products, Dap Incorporated, Dynatron Bondo Corporation, Kirkland & Ellis, Loctite Corporation, Pierce & Stevens Corporation, Rawn Company, Devcon Company, Wilsonart International, and Stoel Rives L.L.P. We also studied technical literature and a variety of product labels.

The revised definition incorporates four key characteristics of contact adhesives that are typically mentioned in the use instructions or other portions of the product labeling for these adhesives. The first characteristic of a contact adhesive, as specified in section (A) of the revised definition, is that the adhesive is designed for application to *both surfaces* to be bonded together. A contact adhesive is an adhesive having the property of "autohesion," which is the bonding of two adhesive surfaces to each other. In contrast, other adhesives function primarily by forming bonds between the adhesive surface and the substrate to be joined. Since a contact adhesive works by bonding to itself, both substrates must be coated.

The second characteristic of a contact adhesive, as specified in section (B) of the revised definition, is that the adhesive is *allowed to dry* before the two surfaces are placed in contact with each other. Contact adhesives join surfaces by dry bonding, whereby most of the solvent must evaporate from the adhesive coatings before surfaces are joined. The time required for a contact adhesive to dry before bonding varies according to the particular solvents used in the adhesive. Water-based formulations typically require the longest drying times. Ambient temperature,

humidity, air movement and adhesive thickness also affect drying time. Similarly, the usage instructions for contact adhesives we studied also vary in their recommendations for drying time. For example, manufacturers either advise users to wait from 2 to 40 minutes, until tacky or dry, or until the adhesive's appearance becomes clear. However, our review of technical literature and discussions with a number of adhesives manufacturers have indicated that contact adhesives work best when allowed to dry to the touch. If surfaces are joined before the solvent has evaporated sufficiently, the solvent will remain in the bond, resulting in mushy and soft bonds.

The third characteristic of a contact adhesive, as specified in section (C) of the revised definition, is that the adhesive forms an *immediate bond that is impossible, or difficult, to reposition* after both adhesive-coated surfaces are placed in contact with each other. After being allowed to dry, contact adhesive coated surfaces bond instantly to each other upon contact. Although a contact adhesive bond reaches its maximum strength over time, it has a high immediate green strength. Consequently, realignment of surfaces is impractical after contact is made. Most of the product labels for contact adhesives we looked at warned users to align pieces carefully, or position them exactly, before contact, and/or that readjustment of pieces is impossible, or difficult, after contact.

The fourth characteristic of a contact adhesive, as specified in section (D) of the revised definition, is that the adhesive does *not need sustained pressure or clamping* of surfaces after the adhesive-coated surfaces have been brought together using *sufficient momentary pressure to establish full contact* between both surfaces. Due to the immediate high green strength of contact adhesives, many contact adhesive product labels advise users that no additional pressure or clamping is necessary after surfaces have been placed in full contact. However, moderate to heavy momentary pressure is necessary to ensure good contact between adhesive surfaces at the molecular level so that autohesion may occur. For joining small parts, a firm press is often advised, whereas for bonding large surfaces, such as countertops, usage instructions usually recommend applying substantial contact pressure over the entire surface by means of a rubber mallet or hand roller.

The final sentence of the revised definition would clarify that *rubber cements* are not included as contact adhesives if they are primarily intended for use on paper substrates. Contact adhesives are suitable for bonding a wide variety of substrates including floor tile, plastic laminates, rubber, wood, leather, veneer, fabric, wall paper, glass, metal, molding and cork. Rubber cements, on the other hand, are primarily intended for joining paper substrates with temporary, easily removable bonds. Rubber cement may also be used as a contact adhesive to form a stronger, permanent bond. However, the bond is weaker than that of traditional contact adhesives.

4. Amend the code-dating requirement to exempt manufacturers of zero-VOC products from the need to code-date those products

This amendment is proposed to provide relief to manufacturers because we have determined that products containing no VOCs, or products with very small amounts of VOCs (namely, those products with a VOC concentration of 0.10 percent VOC by weight or less) do not require code-dating. However, code-dating is still required for all products that contain

greater than 0.10 percent by weight VOCs, even those VOCs that are determined to be low vapor pressure VOCs.

D. AMENDMENT TO THE VOC DEFINITION IN THE CONSUMER PRODUCTS REGULATION AND THE AEROSOL COATINGS REGULATION

Description of the Amendment

We are proposing to modify the VOC definition to exempt perchloroethylene from the VOC definition in the consumer products regulation and the aerosol coatings regulation. The modification to the consumer products regulation would also affect the Alternative Control Plan (ACP) regulation for consumer products because the ACP regulation incorporates by reference the VOC definition in the consumer products regulation (see Title 17, California Code of Regulations, Article 4, Alternative Control Plan, sections 94540-94555). It is important to note that the proposed exemption does not affect the regulations implemented by the local air pollution control districts in California. Those districts that wish to exempt perchloroethylene from the regulations would still need to conduct their own environmental impacts analysis to justify such an exemption.

Justification for This Amendment

The U.S. EPA recently exempted perchloroethylene (published in 61 FR 4588) from its VOC definition (40 CFR 51.100(s)). The exemption was based on recent studies documenting the negligible contribution to ground-level ozone formation from these compounds (i.e. negligible photochemical reactivity). Subsequent to the U.S. EPA's exemption of perchloroethylene, we began a comprehensive evaluation to determine whether any significant adverse impacts to the environment could result from exempting perchloroethylene from the consumer product VOC definition in California. Given the air quality needs of California, we believe that it is important to conduct analyses that are specific to California conditions. Our environmental impacts assessment for this proposal is presented in the following chapter. As has been discussed previously, especially with regard to the automotive brake cleaners category, this exemption would provide manufacturers additional flexibility in formulating complying products without increasing ground-level ozone levels.

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IV.

ENVIRONMENTAL AND ECONOMIC IMPACTS

A. INTRODUCTION

The first section of this chapter consists of our environmental and economic impacts analysis regarding the proposed amendment to the effective date for the aerosol adhesives standard. The second section of this chapter presents our environmental and economic impacts analysis for the proposed exemption of perchloroethylene from the VOC definition in the consumer products regulation and aerosol coatings regulation. None of the remaining proposed modifications, including those proposed amendments intended to clarify and improve enforceability of the regulation, changes to improve consistency with the antiperspirant and deodorant regulation, and the proposed exemption of those products with no VOCs from the code-date requirements, have any reasonably foreseeable adverse environmental impacts.

Legal Requirements Applicable to the Environmental and Economic Impacts Analyses

Both the California Environmental Quality Act (CEQA) and Board policy require the ARB to consider the potential adverse environmental impacts of proposed regulations. Because the ARB's program involving the adoption of regulations has been certified by the Secretary of Resources (see Public Resources Codes section 21080.5), CEQA allows the ARB's environmental analysis to be included in the ARB Technical Support Document (TSD) in lieu of preparing an environmental impact report or negative declaration. In addition, the ARB will respond in writing to all significant environmental points raised by the public during the public review period or at the Board hearing. These responses will be contained in the Final Statement of Reasons for the modifications to these regulations.

On January 1, 1994, the requirements of SB 919 became effective (Stats. 1993, Chapter 1131). Among other provisions, SB 919 amended CEQA by adding new Public Resources Code section 21159. For certain regulations, Public Resources Code section 21159 requires the ARB to conduct an environmental analysis which includes, at a minimum, all of the following: (1) an analysis of the reasonably foreseeable environmental impacts of the methods of compliance, (2) an analysis of the reasonably foreseeable feasible mitigation methods, and (3) an analysis of the reasonably foreseeable alternative means of compliance with the regulation.*

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* Public Resources Code section 21159 applies only to the adoption of a regulation "...requiring the installation of pollution control equipment or a performance standard or a treatment requirement...". Since none of the proposed consumer product amendments fall within these criteria, for this rulemaking the ARB is not required to comply with section 21159. Staff has nevertheless performed the environmental analysis specified in section 21159 in the interest of fully examining the environmental impacts of the proposed regulation.

Two bills passed by the California Legislature in 1993 require regulators to evaluate the effect of regulations on jobs, business, and the ability to compete in the national marketplace. These bills are: (1) Senate Bill 513 - Job losses and gains; Business creations and elimination, and; (2) Assembly Bill 969 - Business competitiveness. Senate Bill 513 requires State agencies to assess the potential impact of their regulations on California jobs and on business expansion, elimination, or creation.

Assembly Bill 969 requires a state agency to include the ability of California business to compete with business in other states in its adverse economic impact assessment. The requirements of these bills, as well as other economic analysis requirements, are codified in Government Code sections 11346.3 and 11346.5.

B. ENVIRONMENTAL AND ECONOMIC IMPACTS OF AMENDMENTS TO THE CONSUMER PRODUCTS REGULATION (EXCLUDING THE AMENDMENT TO THE VOC DEFINITION)

1. Environmental Impacts Analysis

Summary and Findings

The primary environmental impact of postponing the 25 percent aerosol adhesives standard is that fewer VOC emission reductions will be obtained between 1997 and 2002 from this category (i.e., approximately 0.2 tons/day statewide emission reductions will be lost). However, a possible benefit to extending the standard to 2002 is a reduction in the potential for increased exposure to methylene chloride. This benefit is possible because some manufacturers may have increased the amount of methylene chloride in their products to achieve the standard. None of the remaining proposed modifications, including those proposed amendments intended to clarify and improve enforceability of the regulation, improve consistency with the antiperspirant and deodorant regulation, and exempt those products with no VOCs from the code-dating requirement, have any reasonably foreseeable adverse environmental impacts.

Overriding Considerations for the Proposed Amendments to the Consumer Products Regulation

In the previous discussion, we identified one negative environmental impact that would occur as a result of these amendments: that of fewer VOC emission reductions obtained during the period of postponement of the aerosol adhesives 25 percent VOC standard. However, the postponing of this standard is intended to preserve the technical feasibility of the standard and assure that a variety of products are available to consumers. The proposed amendments would also achieve fairer, more equitable treatment for those manufacturers not wishing to use methylene chloride in their products. The amendment would also help ensure that manufacturers do not increase their use of methylene chloride to comply with the 25 percent VOC standard before alternative technology is in place. We believe that these considerations override any adverse environmental impacts that might occur as a result of the postponement.

2. Economic Impacts Analysis

Summary of Economic Impacts

The staff has evaluated the potential economic impact of the proposed amendments to the standard limiting the VOC content of aerosol adhesives. Based upon our evaluation, the proposed amendments do not impose significant adverse impacts on California businesses and individuals. Nor is any noticeable change expected in businesses' competitiveness; employment; and business creation, elimination, or expansion. In fact, the amendments are expected to induce innovation and cost savings because businesses will have additional time to meet the standard.

Businesses Affected

Any business which manufactures or markets aerosol adhesives subject to the requirements of the Regulation for Reducing Volatile Organic Compound Emissions from Consumer Products (section 94507-94517) can potentially be affected by the proposed modifications. According to 1996 ARB survey results, there were ten manufacturers supplying aerosol adhesives to the California market in 1995. One of these manufacturers has a California manufacturing plant and two others are California-based.

Potential Impacts on Business

The proposed amendments are most likely to have a positive impact on California business. These amendments were developed in response to business concerns that the industry may not be able to achieve the second tier VOC standard of 25 percent for aerosol adhesive products by January 1, 1997. A few manufacturers have been able to produce adhesive products meeting the 25 percent standard using methylene chloride, identified by the ARB as a toxic air contaminant. Because of health concerns associated with its use, methylene chloride is not an acceptable substance for many manufacturers. Even those manufacturers who use methylene chloride prefer to maintain a variety of products with different formulations in the marketplace.

The proposed amendments are intended to provide manufacturers of adhesive products with additional time to continue their efforts in developing compliant products. This extension would relieve manufacturers from rushing lesser quality products into the California market or abandoning the market as a whole. California consumers would also benefit from the extension by not being denied access to quality products. In the long run, consumers would also benefit from having access to improved adhesive products at reasonable prices.

Potential Impact on Business Competitiveness

The proposed amendments would have no impact on competitiveness of California businesses. This is because the request for the time extension is universal in the industry. Even those businesses that already meet the 25 percent VOC standard for certain adhesive products using methylene chloride would benefit from additional time to explore other reformulation options.

Potential Impact on Employment

No noticeable change in employment is expected from the proposed amendments. Some jobs, however, may be created as businesses allocate resources to reformulate their products. The amendments may also prevent some job losses due to abandoning the California market by businesses which will not be in compliance by January 1, 1997.

Potential Impact on Business Creation, Elimination, or Expansion

The proposed amendments would have no noticeable impact on the status of California businesses. Some business opportunities, however, may be created for chemical suppliers and consultants as adhesive manufacturers continue to invest in research and development efforts.

C. ENVIRONMENTAL AND ECONOMIC IMPACTS OF AMENDMENT TO THE VOC DEFINITION IN THE CONSUMER PRODUCTS REGULATION AND THE AEROSOL COATINGS REGULATION

1. Environmental Impacts Analysis

Summary of Environmental Impacts

Based on our analysis, we expect that the exemption of perchloroethylene from the VOC definition in the aerosol coatings regulation will not have any significant adverse environmental impacts. However, the ARB staff has determined that there is a very slight possibility that the exemption of perchloroethylene from the VOC definition in the consumer products regulation may have an adverse impact on the environment. We conducted our analysis with consideration of potential impacts on water quality, landfill loading, air quality, and toxicity.

Because we cannot rule out a possible adverse impact from the proposed exemption for perchloroethylene, we evaluated five different alternatives to the proposed exemption. None of these alternatives were determined to be feasible or necessary at this time, and we determined that two of the five alternatives are likely to increase ground-level ozone. Since the possibility of an adverse impact from the proposed exemption is slight, we determined that the appropriate step to take at this point is to exempt perchloroethylene from the VOC definition and closely monitor its emissions from consumer products and the resulting public exposure. Based on this monitoring effort, we would be able to determine whether any adverse impacts are really occurring due to the VOC definition change and, if so, assess the feasibility of taking additional steps. Such additional steps can include, but are not limited to, public outreach efforts, regulatory changes, and developing an Airborne Toxic Control Measure (ATCM) for classes of industrial facilities which emit large amounts of consumer product-based perchloroethylene. If needed, these steps can be taken in order of increasing stringency to mitigate any real impacts that may occur.

Environmental Impacts Analysis

In analyzing the potential environmental impacts from the proposed exemption, it is

important to keep in mind that the modification is designed to allow the use of an additional alternative compound, perchloroethylene, to comply with the VOC standards in the affected regulations. The Board has already determined that the antiperspirant and deodorant, consumer products (Phases I and II), aerosol coatings, and alternative control plan (ACP) regulations (collectively "the consumer products regulations") would have no significant adverse environmental impacts (ARB, 1990b; ARB, 1992; ARB, 1994; ARB 1995a). Rather, the consumer product regulations would result in beneficial environmental impacts due to a reduction in VOC emissions as manufacturers reformulate their products to comply with the VOC requirements. In these reformulations, manufacturers will be relying on technologies for which the possible impacts have already been thoroughly analyzed and considered by the ARB.

We have determined that the proposed exemption of perchloroethylene in the aerosol coatings regulation will have no adverse environmental impacts. We expect no adverse impacts because the aerosol coatings regulation contains a provision which essentially prohibits "new or increased uses" of perchloroethylene. Specifically, the provision (section 94522(d)) prohibits any person from selling, supplying, offering for sale, applying, or manufacturing for use in California any aerosol coating product which contains perchloroethylene, except for: (1) existing complying products containing perchloroethylene that were sold in California in 1992, and (2) noncomplying products containing perchloroethylene that were sold in California in 1992 that were reformulated to comply with the aerosol coatings regulation, provided the perchloroethylene content of such products do not increase. Moreover, an ARB survey of aerosol coating products sold in 1992 revealed no products containing perchloroethylene, and no manufacturer stated during the rulemaking process that perchloroethylene is necessary to meet the aerosol coatings standards (ARB, 1995c; ARB, 1995a).

The ARB staff included the provision prohibiting any new or increased uses of perchloroethylene primarily because staff was concerned that the use of perchloroethylene in aerosol coatings could increase significantly if perchloroethylene was later exempted as a VOC. Staff's concern is especially applicable to products that are reformulated to meet the second-tier aerosol coatings standards. However, as detailed later in this chapter, the ARB staff determined that the potential for increased emissions of perchloroethylene in the consumer products regulation under the proposed exemption is far lower than the potential for such an increase in aerosol coatings. Therefore, ARB staff is not proposing a similar prohibition on new or increased uses of perchloroethylene in the consumer products regulation.

From our finding that the proposed amendment to the consumer products regulation may potentially result in a small increase in perchloroethylene emissions, we concluded that there is a slight potential for an adverse environmental impact. During the analysis, the staff considered the possible impacts to the environment if manufacturers formulate products to take advantage of the proposed modification to the VOC definition (note: manufacturers already use perchloroethylene in a variety of household and automotive care products). In this analysis, we were primarily concerned with the possibility of any adverse impacts to ground-level ozone and toxicity occurring as a result of reformulations using perchloroethylene. Other impacts that we evaluated include the possibility for increased depletion of stratospheric ozone, increased global warming, increased landfill loading, and impacts to water quality. Each of these issues is discussed in more detail in "Findings" below, with an analysis of the reasonably foreseeable environmental impacts of

the methods of compliance and an analysis of reasonably foreseeable mitigation measures.

With regard to the reasonably foreseeable alternative means of compliance with the regulation, these have already been thoroughly analyzed and found to be environmentally beneficial by the Board. As noted previously, the reasonably foreseeable alternative means of compliance are the commercially and technologically feasible technologies already considered by the Board as being beneficial to the environment. Therefore, we foresee no adverse impacts from the alternative means of compliance in regard to the proposed VOC definition amendment.

Findings

In evaluating the cross-media potential impacts from the proposed exemption, it is important to keep in mind that perchloroethylene is already used in ARB-regulated consumer products, mainly aerosol brake cleaners. Relative to other sources, however, the perchloroethylene emissions from consumer products are just a fraction of the total perchloroethylene emissions from stationary facilities in California. As shown in Table IV-1, perchloroethylene usage in consumer products is just a portion of the 10 percent miscellaneous uses (industrial cleaners, textiles, pharmaceuticals, printing inks, and dielectric fluids). Other uses, including dry cleaning, degreasing, paints and coatings, and adhesives, are by far the largest sources of perchloroethylene in California (ARB, 1993):

Table IV-1. 1991 Perchloroethylene Usage by Source Category

Source Category	Perc. Usage (1000 Gals) in 1991	Percent of Total (%)
Dry Cleaning	1,100	60
Degreasing	390	20
Paints and Coatings	150	8
Industrial Adhesives	40	2
Miscellaneous	190	10
Total	1,870	100

Source: *Id*.

Impacts on Water Quality

After the application of a consumer product, the perchloroethylene in that product generally has six potential pathways to surface water, groundwater, or the wastewater treatment system:

(1) evaporation into the atmosphere, with subsequent wet or dry deposition to

surface water;

(2) direct transfer into storm sewer lines, with subsequent transfer to the ocean or other surface water;

(3) direct transfer into storm sewer lines, with subsequent leakage and percolation into the soil and aquifer

(4) direct transfer into sanitary sewers, with transfer to publicly-owned wastewater treatment (POTW) systems;

(5) direct transfer into sanitary sewers, with subsequent leakage and percolation into the soil and aquifer; or

(6) direct application near soil, with subsequent percolation into the soil and aquifer.

Storm sewers are those sewer lines which are designed to catch rain and storm water runoff for discharge into rivers, lakes, oceans, or other bodies of water. On the other hand, the sanitary sewer system is designed to catch effluent from residential and industrial facilities for primary and/or secondary treatment prior to discharge into bodies of water. Leakage of effluent from either storm or sanitary sewer systems can occur due to breakage of the sewer lines or other factors.

We do not expect pathway (6) to be a significant removal process, since the ARB-regulated products designed to be applied directly to or near soil, such as insecticides, do not contain perchloroethylene (U.S. EPA, 1990). Similarly, we do not expect pathways (2) and (3) to be significant or likely sources of perchloroethylene in surface or groundwater. This conclusion is based on the fact that engine degreasers are the only products currently regulated by the ARB, other than aerosol brake cleaners, that contained some perchloroethylene in 1990 (*Id.*). The technical assessment ARB staff conducted in 1995 for engine degreasers showed that the companies responsible for about 95 percent of the market were either already complying or well on their way toward meeting the 50 percent VOC limit. In the assessment, the manufacturers contacted by ARB staff cited the use of water, stronger detergents, low vapor pressure solvents, terpenes, or microemulsion technologies to meet the standard. However, they did not cite perchloroethylene as a necessary ingredient for complying with the standard (ARB, 1995f). Because engine degreasers have several feasible non-perchloroethylene-based formulation options, we do not expect a significant potential for perchloroethylene to be transferred to surface or groundwater via pathways (2) and (3). Based on this information, we focused our analysis on water quality impacts resulting from the potential pathways (1), (4) and (5) cited above.

Evaporation and Wet/Dry Deposition of Perchloroethylene to Surface Water

Due to perchloroethylene's relatively high vapor pressure of 18.47 mm Hg at 25^{o}C (ARB, 1996b), it is reasonable to assume that the perchloroethylene in an application of a consumer product would evaporate into the air unless it is transferred to other media soon thereafter. Once in the atmosphere, the perchloroethylene could be subject to a number of physicochemical removal processes; the primary atmospheric removal mechanism has been identified as the chemical reaction of perchloroethylene with hydroxyl ion (OH^{-}) radicals (see "Impacts on

Stratospheric Ozone Depletion" below). Gas-phase reaction with hydroxyl radicals results in an estimated half-life and atmospheric lifetime for perchloroethylene of about 2 months and 3 months, respectively (*Id*. at p.881).

Relative to chemical removal mechanisms, the physical removal of perchloroethylene from the atmosphere, via adsorption onto solid particulates ("dry" deposition) or by "washout" due to contact with rain or other forms of vaporized water ("wet" deposition), is not expected to be a significant removal mechanism. Citing work by Cupitt on the chemically-similar ethylene dichloride ($C_2H_2Cl_2$), ARB staff estimated that the atmospheric half-life of perchloroethylene, under conditions of removal by dry and wet deposition, are approximately 9 and 270 years, respectively (ARB, 1993, *op cit*. at p. I-5). These very long estimated half-lives indicate that the chemical removal mechanisms in the atmosphere are the dominant removal processes for perchloroethylene. Thus, significant wet or dry deposition of atmospheric perchloroethylene to surface water is highly unlikely.

Transfer of Perchloroethylene to Ground or Surface Water via Sanitary Sewers

From the previous discussion, the remaining potential pathways (4) and (5) for perchloroethylene to transfer to surface or groundwater involve the sanitary sewer system, either through the POTW system or via leakage and subsequent percolation into the soil and aquifer. To evaluate the possible impacts the proposed exemption could have on water quality, we considered the potential for increased perchloroethylene levels to enter the sanitary sewer system relative to the levels that are already occurring prior to the proposed exemption.

As discussed in further detail in the "Impacts on Toxicity" section below, the 1990 U.S. EPA consumer/commercial products database and discussions with industry representatives indicate that the aerosol brake cleaners category is the most likely one to experience some increase in perchloroethylene usage under the proposed exemption. Based on typical label usage instructions for these products, it is reasonable to expect that, when the products are used and disposed of properly, the proposed exemption would have no significant adverse impacts to the sanitary sewer/POTW system in California. As shown in the usage instructions, these products are typically designed to be sprayed onto brake assemblies and allowed to dry*;* they are not designed, intended, or labeled to be applied in such a way that their contents would likely be directly discharged into the sanitary sewer system (Appendix D). Thus, the use of an aerosol brake cleaner in a manner that leads to potential discharges of its contents into the sanitary or storm sewer system is clearly a misuse of the product.

In studies conducted as part of a U.S. EPA-sponsored environmental justice research contract, Dr. Katy Wolf of the Institute for Research and Technical Assistance (IRTA) observed some auto mechanics misusing aerosol brake cleaners on engine parts that had already been cleaned in an aqueous cleaning solution (Wolf, 1996). After subjecting the parts to cleaning in the aqueous solution, the mechanics sprayed aerosol brake cleaners on the parts if the parts were not visibly clean shortly after immersion. These parts were then placed back into the aqueous solution, presumably for "further cleaning." Since the aqueous cleaners were, in some cases, touted by their manufacturers as being "sewer safe," there is a potential for the perchloroethylene-contaminated aqueous solution to be discharged into the sanitary sewer line at the repair facility.

It should be noted that, in such cases, the facility could be illegally discharging other contaminants, such as other solvents in the product or heavy metals/soils from the cleaned parts, in addition to any perchloroethylene residue on the parts.

We evaluated these claims and, for the reasons discussed below, conclude that it is highly unlikely for the proposed exemption to result in a significant adverse impact to water quality relative to current practices. First, perchloroethylene is already used in most aerosol brake cleaners (U.S. EPA, 1990, *op cit.*; see "Impacts on Toxicity"). Moreover, ARB staff's current technical assessment of selected consumer product categories found that most aerosol brake cleaners can or will be able to meet the 1997 VOC limit of 50 percent (w/w) using a variety of technologies. These complying formulations include water-based technologies, low-vapor pressure compounds, terpenes, and perchloroethylene, but they are not solely dependent on using perchloroethylene (ARB, 1996a). Thus, any incremental increase in perchloroethylene content in aerosol brake cleaners resulting from the proposed exemption is likely to occur in relatively few products. Since consumer products (including brake cleaners) were noted previously to comprise only a fraction (less than 10 percent) of the total perchloroethylene usage in California from all sources, it appears that any increase in perchloroethylene use in brake cleaners would be very minor relative to all other sources of perchloroethylene.

Dr. Wolf provided no data documenting the frequency of the observed misuse of aerosol brake cleaners and the amount of perchloroethylene residue on the parts. It is entirely possible that her observations were of isolated cases, rather than the industry norm. The South Coast Air Quality Management District (SCAQMD) staff, during the field development of the recent amendments to their Rule 1171 (Solvent Cleaning Operations), observed no instances of such product misuses (Yuhas, 1996). In 1993, Norton conducted a survey of professional users of aerosol brake cleaners; he found that slightly more than half of those surveyed used the products for other cleaning purposes in addition to brake jobs. However, the data in his study do not indicate that such ancillary uses result in significant discharges of perchloroethylene to sanitary sewers (Norton, 1993).

Even if we assume that these practices are widespread in the automotive repair industry, such practices involving existing levels of perchloroethylene in aerosol brake cleaners do not appear to result in widespread impacts to POTWs. For instance, when the East Bay Municipal Utility District (EBMUD) recently prohibited the discharge of perchloroethylene into the sewer system from the large identified industrial sources of perchloroethylene (e.g., dry cleaners, aerospace facilities, adhesive applications, etc.), the level of perchloroethylene in the wastewater system dropped to levels where no further restrictions were required by the district (Witherspoon and Adams, 1996). In this case, the current levels of perchloroethylene in aerosol brake cleaners appeared to have little or no impact on the overall perchloroethylene levels the district was experiencing.

Based on the information discussed above, we believe that it is highly unlikely that the potential small increase in perchloroethylene emissions under the proposed exemption would result in an adverse impact on water quality. Because we cannot rule out the possibility of product misuse as described above, however, we will be closely monitoring perchloroethylene emissions from consumer products and will continue to assess whether these adverse

environmental impacts are occurring. If we determine that adverse impacts are occurring, we will implement the mitigation steps discussed later in this chapter.

Impacts on Landfill Loading

With regard to landfill loading, the ARB staff were unable to identify any scenario in which the modified regulations and VOC definitions would result in any impacts to landfills beyond those already evaluated in the rulemaking record for the existing regulations. As stated previously, manufacturers already use perchloroethylene in a variety of household and automotive maintenance products. Based on the existing uses of perchloroethylene, it is reasonable to conclude that reformulated products using this compound would be packaged in the same types of containers and would be used in the same ways as existing products which already contain perchloroethylene. Therefore, we expect no significant additional adverse impacts to landfills from the proposed exemption.

Impacts on Ground-Level Ozone

The VOC definition essentially classifies organic compounds as "reactive," "exempt negligibly-reactive," or "exempt low-reactive" in terms of their propensity to form ozone within short timeframes (i.e., their "photochemical reactivity"). In ARB's existing Low Emissions Vehicle Program and the Consumer Products Reactivity Program (currently under development), the relative reactivity of different VOC species is compared using a scale developed by Dr. William P.L. Carter and based on the concept of Maximum Incremental Reactivity (MIR). Using MIRs for comparison, we find that perchloroethylene's photochemical reactivity is very low (with an estimated MIR of about 0.03 gram ozone/gram perchloroethylene as compared to methane with an MIR of about 0.015) and much less than acetone and ethane, which ARB recently exempted based on an ozone formation screening analysis conducted for these compounds (Carter, 1996; U. S. EPA, 1996; ARB, 1995e).

Because perchloroethylene has a reactivity less than that of other compounds which were exempted by ARB for low reactivity, the use of perchloroethylene should not result in adverse impacts to ground-level ozone. More importantly, if perchloroethylene is substituted for more reactive compounds (e.g., petroleum distillates, aromatics, alcohols), the net effect would be additional reductions in ground-level ozone. The overall reduction in ground-level ozone should, therefore, be the same or greater under the proposed modification than it would be under the existing regulations without the perchloroethylene exemption. Because of this, we expect no adverse impacts to ground-level ozone due to the proposed modification.

Impacts on Stratospheric Ozone Depletion

It is well established in the scientific literature that certain halogenated compounds, particularly some chlorine-containing alkanes, contribute to the depletion of the stratospheric ozone layer. Although perchloroethylene has four chlorine atoms, it has a C=C double bond that is somewhat susceptible to attack in the lower troposphere by hydroxyl (OH^-) radical or other degradation mechanisms. As noted previously, the gas-phase reaction with hydroxyl radicals results in a calculated half-life and atmospheric lifetime for perchloroethylene of 2 months and 3

months, respectively.

While its atmospheric lifetime is long enough to facilitate inter- and intrabasin transport, perchloroethylene does not persist in the atmosphere long enough for upward transport into the stratospheric layer. Perchloroethylene is therefore highly unlikely to have a significant ozone depletion potential. For comparison, the ozone depleting compound with the shortest atmospheric lifetime is HCFC-121 (C_2HFCl_4), as listed by the U.S. EPA in Title VI of the federal Clean Air Act; this hydrochlorofluorocarbon has an estimated atmospheric lifetime of 0.6 years (219 days). Methylene chloride, on the other hand, has an estimated atmospheric lifetime of 131 days and is not considered to be ozone depleting (56 FR 2420). Thus, based on perchloroethylene's relatively short atmospheric lifetime and the fact that perchloroethylene is not considered by the U.S. EPA as ozone depleting, we do not expect the proposed modification to the VOC definition to significantly add to existing stratospheric ozone depletion.

Impacts on Global ("Greenhouse") Warming

The theory of global warming is based on the premise that large amounts of certain man-made pollutants, in conjunction with naturally-occurring gases, absorb infrared radiation in the atmosphere, thereby increasing the overall average global temperature. While a significant and measurable warming effect caused by man-made chemicals in the atmosphere has not been conclusively proven, there is a growing belief in the scientific community that anthropogenic emissions are indeed contributing to global warming. Because of this, it is important to evaluate the potential for the proposed exemption for perchloroethylene to contribute to global warming.

The ARB staff do not expect the proposed exemption of perchloroethylene to contribute significantly to existing global warming. Currently, neither ARB nor the U.S. EPA recognizes perchloroethylene as a greenhouse gas. On the other hand, ground-level or tropospheric ozone is widely recognized as one of the primary greenhouse gases (i.e., carbon dioxide, methane, oxides of nitrogen; chlorofluoro/bromo-alkanes; Abrahamson, 1989). Therefore, to the extent that manufacturers substitute perchloroethylene for more reactive and ozone-forming compounds in their products (see "Impacts on Ground-Level Ozone"), the resulting reductions in ground-level ozone should help alleviate global warming.

Impacts on Toxicity

Perchloroethylene is currently listed as a hazardous air pollutant (HAP) under section 112(b) of the federal Clean Air Act and as a toxic air contaminant (TAC) under the AB 1807 Toxic Air Contaminant Identification and Control Program in California. Because of these listings, it is important to evaluate the potential for toxicity impacts under the proposed modification to exempt perchloroethylene from the VOC definition. To this end, we conducted our evaluation using the speciated 1990 U.S. EPA consumer and commercial products database ("U.S. EPA 1990 database"), the development of which was mandated under section 183(e) of the 1990 amendments to the federal Clean Air Act.

Analytical Methodology

Our analysis approach was relatively straightforward. We used the U.S. EPA 1990 database to identify the California-regulated product category which is most likely to be reformulated with perchloroethylene, thereby resulting in the highest potential human health impacts. As discussed later, we identified this product category to be aerosol brake cleaners. We then determined "likely" and "worst-case" usage and emissions scenarios to model the expected impacts to people in the workplace and nearby locations. We believe the typical household mechanic uses only about a can of aerosol brake cleaner annually or biennially; the expected impacts to household consumers, if any, are likely to be transient and negligible. This analysis, therefore, focuses on impacts from the proposed amendment on the professional workplace, where aerosol brake cleaners are used more frequently and in greater amounts, and on areas downwind of the repair shops.

Because the greatest impacts from a toxicity standpoint would likely result from the inhalation of perchloroethylene, we focused on determining the airborne concentrations of perchloroethylene after application of an aerosol brake cleaner. For the interior of an auto repair shop, we used an appropriate airborne exposure model to determine the resulting room air concentrations of perchloroethylene after application of products in shops of varying dimensions and ventilation rates. We then compared these projected room air concentrations of perchloroethylene with the applicable State and federal acute permissible exposure levels (PELs). For the surrounding areas, we used the appropriate dispersion models for projecting the highest 1-hour and maximum annual average perchloroethylene concentrations at varying distances from the shops. These outdoor ambient concentrations were then used to estimate acute and chronic non-cancer and potential cancer health impacts to the maximum exposed individual (MEI) outside the facility.

Selection of Aerosol Brake Cleaners for Analysis

State law requires consumer products containing TACs such as perchloroethylene to carry a "Proposition 65" warning on their label (Safe Drinking Water and Toxic Enforcement Act of 1986). Because of the perceived stigma and potential liability issues associated with Proposition 65 label warnings, we believe that most household and all personal care products are unlikely to be reformulated with perchloroethylene. Industry representatives have indicated during previous rulemakings that products with such warnings have restricted marketability. We also eliminated antiperspirants/deodorants and aerosol coating products as candidate categories for potential increases in perchloroethylene usage because of those regulations' prohibitions against new or increased uses of TACs such as perchloroethylene (CCR, 1996). Pesticidal products that are regulated by the ARB (e.g., crawling bug sprays) were also eliminated as candidates because none of these products were reported in the U.S. EPA 1990 database to use perchloroethylene.

This process of elimination left the automotive care products (engine degreasers, carburetor-choke cleaners, and brake cleaners) which, according to the U.S. EPA 1990 database, used perchloroethylene to some degree in 1990. However, we eliminated carburetor-choke cleaners as candidates for this analysis, because products that are intended to enter the combustion chamber with the fuel are prohibited by federal requirements from containing elements other than carbon, nitrogen, oxygen, hydrogen, and sulfur (note: the few products self-

reported to contain perchloroethylene were probably reported erroneously or were non-aerosol, parts dip-type liquid products). The U.S. EPA 1990 database and discussions with industry representatives confirmed our determination that the two remaining automotive care products, especially brake cleaners, are the currently-regulated categories that are most likely to be reformulated with perchloroethylene (Fratz, 1996; Haluza, 1996).

We analyzed the U.S. EPA 1990 database and determined "typical" formulations for engine degreasers and brake cleaners, which are presented in Table IV-2. As Table IV-2 shows, brake cleaners contained significantly more perchloroethylene than engine degreasers. More importantly, engine degreasers are designed for typical use by automotive mechanics in an outdoor or semi-enclosed environment, such as a driveway or car wash (see typical product labels in Appendix D). Because of the high air exchange rates available outdoors, applications of engine degreasers in such open-air settings would tend to minimize user exposure to perchloroethylene via inhalation. On the other hand, brake cleaner products are likely to be used in more closed environments (e.g., garages, automotive repair bays), where air exchange rates are dictated to a greater degree by room dimensions and ventilation system parameters. Based on these reasons, we focused our analysis to determine human health impacts on the potential for perchloroethylene to be used in reformulated brake cleaners.

Table IV-2. Comparison of Typical Brake Cleaner and Engine Degreaser Formulations in 1990

Ingredient	**Wt. % in Typical Engine Degreaser***	**Wt. % in Typical Brake Cleaner***
Petroleum Distillates	42.5%	6.2%
Toluene	0.1%	7.7%
Xylene	3.0%	0.5%
Ketones	0.0%	0.6%
Alcohols	2.6%	7.2%
Propellants	1.8%	0.7%
Glycol ethers	2.4%	-----

Terpenes	4.5%	-----
Other VOCs	3.1%	2.1%
VOC Subtotal (A)	60.0%	25%
Perchloroethylene (B)	**3.5%**	**67.4%**
Other Non-VOCs (C)	36.5%	7.6%
Total (A+B+C)	100.0%	100.0%
VOC Standard (as of January 1997)	50%	50%

*Source: 1990 U.S. EPA Consumer and Commercial Products Database

With a sales-weighted average VOC content of 25 percent by weight in 1990, the typical brake cleaner had a relatively high perchloroethylene content (67.4 percent w/w) and already met the VOC standard (50 percent by weight limit by January 1, 1997). Since the majority of the market already met the standard, the U.S. EPA 1990 database suggests that only some products above the 50 percent standard would need to be reformulated. To be conservative, we assumed for this analysis that manufacturers with noncomplying products would reformulate to the industry average of 67.4 percent by weight perchloroethylene, rather than 50 percent by weight perchloroethylene. For the worst-case condition, we adopted Norton's assumption that perchloroethylene content would be 96 percent of the product by weight, with the remainder comprised of propellant (Norton, 1993, *op cit.* at p.7).

Exposure Analysis: Long-Term Exposure in the Workplace

To determine the long-term exposure in the workplace (i.e., during a full workday), we used the following 8-hour time weighted average (TWA) predictive model used in a recent study on perchloroethylene emissions from the use of chemical brake cleaners in automotive repair facilities (*Id.* at 8):

$$C_s = \frac{(24.45 \times 10^{-3}\ m^3/mol)(A)(B)(10^6)}{(M)(V)(1 + D)}$$

where,

C_s = predicted room concentration of perchloroethylene, ppm
A = perchloroethylene content per can, grams/can
B = number of cans used per work period
M = molecular weight of perchloroethylene, 165.8
V = shop volume, m^3
D = shop volume changes/work period

$$= \frac{(F)(60 \text{ min / hr})(8 \text{ hr / work period})}{H}$$

F = air turnover rate, 1.5 $ft^3/min\text{-}ft^2$ (the Building Officials and Code Administrators (BOCA) standard for air flow in an automotive repair facility)

H = repair shop ceiling height, ft (15.6-20 ft; *Id.* at Table 2)

We chose Norton's model for this analysis since it was developed specifically to predict perchloroethylene concentrations after the use of chemical brake cleaners in automotive repair facilities. To run the model, we used the input parameters shown in Table IV-3:

Table IV-3. Input Parameters for Brake Cleaner Perchloroethylene Emissions Predictive Model

Parameter	Description	Range of Values	Source	Comments
A	grams perc./15 oz. can	287 - 414	ARB, 1996c	Perc Range = 67.4% - 95.9% (w/w)
A	grams perc./20 oz. can	383 - 544	Norton, 1993	Perc Range = 67.4% - 95.9% (w/w)
B	no. cans/work period	1 - 1.5	Norton, 1993	Table 12; Norton, 1993
V	shop volume, m^3	1874 - 4733	Norton, 1993	Assumed Ht. = 15.6 ft
D	shop air turnover, hr^{-1}	12 - 46	Norton, 1993	Typical D at Ht. =15.6 ft. Assumed Low D = 25% of typical

Notes: 1) "Typical" perchloroethylene (perc.). content assumed to be perc. content in brake cleaners existing in 1990 (i.e., this formulation is assumed to be "successful" and therefore reformulations with perchloroethylene would tend to emulate this level).
2) "Worst-case" perc. content assumes aerosol product which is comprised solely of perc. and propellant, an unlikely scenario.
3) "Worst-case" shop air turnover at 25% of typical air turnover rate is assumed based on similar assumption in Norton, 1993.

Table IV-4 shows the predictive model results using the input parameters in Table IV-3. These results indicate that an automotive mechanic repairing brakes under typical and assumed worst-case conditions would be exposed to time-weighted average room concentrations of perchloroethylene (over an 8-hour work period) many times lower than State and federal permissible exposure levels.

Table IV-4. Predicted Time-Weighted Average Perchloroethylene Concentrations Under Varying Shop Volumes and Perchloroethylene Contents

	Predicted TWA Range Over 8-hour Work Period*, (ppm)		**Comparison to State and Federal Permissible Exposure Levels (PELs)****
	Perc. content, grams		
	in a 15 oz (426 g) can	**in a 20 oz (568 g) can**	

Shop Volume	287 gram (67.4%)	383 (95.9%)	414 (67.4%)	544 (95.9%)	Federal (PEL = 100 ppm)	State (PEL = 25 ppm)
1874 m^3	0.5 - 3 ppm	1 - 4 ppm	1 - 4 ppm	1 - 5 ppm	**20-fold below**	**5-fold below**
4733 m^3	0.2 - 1 ppm	0.3 - 1 ppm	0.3 - 1 ppm	0.4 - 2 ppm	**50-fold below**	**12-fold below**

*Predicted TWAs are shown as a range to account for range in shop air volume turnover (12-46 hr^{-1}) and number of cans used per work period (1.0-1.5 cans/wk. period).
**Sources: Denny R. and J. Faust, 1996; PELs shown are 8-hour, time-weighted average.

Since perchloroethylene was already being used in most brake cleaners prior to the proposed modification, there should be a relatively minor increase in total brake cleaner perchloroethylene content resulting from new or increased uses. Table IV-4 shows that there is a substantial "cushion" to accommodate any potential increase in brake cleaner uses of perchloroethylene (i.e., the 20 to 50-fold and 5 to 12-fold difference between the predicted results and the federal and State PELs, respectively). Our projections show that it is highly unlikely that the State and federal PELs would be exceeded due to reformulated aerosol brake cleaners. Since the PELs are the currently accepted long-term exposure limits for the workplace, we believe that the proposed exemption will have no significant adverse impacts in the workplace.

Exposure Analysis: Short-Term Exposure in the Workplace

To determine short-term exposure in the workplace, we used the results of a 1994 study commissioned by the Radiator Specialty Company (Cosgrove, 1994). In this study, Cosgrove monitored personal exposure levels (over 15 minute and 3-4 hour periods) for auto repair workers who applied aerosol brake cleaners under normal use conditions. The monitoring involved the use of personal and room detectors; samples were analyzed according to procedures prescribed by the National Institute for Occupational Safety and Health (NIOSH).

Based on his study, Cosgrove reported the following TWA and STEL exposure levels, shown in Table IV-5 and compared with applicable state exposure limits or other guidelines:

Table IV-5. Measured Personal Exposure Levels vs. Applicable Cal/OSHA Limits in Auto Repair Facilities

Perchloroethylene Concentration	Observed Values, ppm		95% Upper Confidence Limit, ppm	Cal/OSHA Limit, ppm	ACGIH TLV
	Mean	Range			
TWA	7.65	4.69 - 16.65	14.49	25	25
STEL	42.16	10.6 - 101	81.20	----	100
Maximum Reading	----	101	----	300	----

Source: adapted from Cosgrove, 1994, p.5

Notes: (1) Cal/OSHA has a 25 ppm 8-hr TWA and a 300 ppm no-exceedance ceiling limit, but does not have a 15-minute short-term exposure limit (Glenndenning, 1996);
(2) Cosgrove reported TWAs for exposure periods of about 3-4 hours; if these were extended to an 8-hr averaging period, the TWAs would likely have been lower.
(3) Cal/OSHA limits apply to all workplaces in California (except for federal facilities).
(4) the ACGIH Threshold Limit Value (TLV) is a recommended limit for good work practice.

As shown in Table IV-5, the TWA and maximum personal exposure levels measured by Cosgrove, under actual workplace and use conditions, were 2-3 times below the applicable California Occupational Safety and Health Administration (Cal/OSHA) limits. Because Cal/OSHA does not specify a short-term exposure limit for perchloroethylene, we also compared Cosgrove's results with the threshold limit value (TLV) recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) for good operating practices. Table IV-5 shows that the reported 15-minute STELs meet the specified ACGIH-TLVs. Even if we use the 95 percent upper confidence limits of the measured values for our comparison, it is clear that the personal exposures still meet the Cal/OSHA TWA and ceiling (i.e., not-to-exceed) limits, as well as ACGIH's recommended TLV limits. Since the exposure levels were several times below the applicable Cal/OSHA limits, we believe there is a sufficient "cushion" to accommodate any likely increase in perchloroethylene emissions from reformulated aerosol brake cleaners. Our projections show it is unlikely that the State and ACGIH short term/ceiling limits would be exceeded due to reformulated aerosol brake cleaners. Since these limits are the currently accepted short-term exposure and ceiling limits for the workplace, we believe that the proposed exemption will have no significant adverse impacts in the workplace.

Exposure Analysis - Health Risk Assessment for Areas Around Auto Repair Shops

To evaluate a brake repair shop's potential impacts on surrounding areas, we conducted a health risk assessment of a hypothetical "typical" brake repair shop. A health risk assessment consists of the evaluation of possible adverse health effects to the community surrounding a facility that emits potentially toxic substances. Potential adverse health effects may include acute non-cancer effects, chronic non-cancer effects, and cancer effects. To

conduct the risk assessment, we used the *"Revised 1992 Risk Assessment Guidelines,"* which were prepared by the California Air Pollution Control Officers Association (CAPCOA, 1993).

Non-Cancer Reference Exposure Levels: Adverse acute effects may result from short-term exposure to a pollutant. Acute exposure to high concentrations of perchloroethylene can cause headaches, dizziness, or irritation of skin, eyes, and the respiratory tract. Chronic non-cancer health effects are those that may result from long-term exposure to relatively low pollutant concentrations. Long-term exposure to low concentrations of perchloroethylene can cause, among other effects, dizziness, diminished cognitive abilities, and can also affect the liver and kidney (ARB, 1993, *op cit.* at VI-2).

Non-cancer reference exposure levels (RELs) have been developed from animal or human studies for a number of substances. Table IV-6 shows the non-cancer RELs for perchloroethylene. These RELs generally include a margin of safety to protect the most sensitive individuals. Potential acute effects can be evaluated by comparing the one-hour

maximum ground level concentration with the reference level in Table IV-6. Similarly, chronic non-cancer effects are evaluated by comparing the estimated annual average ground level concentration of perchloroethylene with the chronic REL in Table IV-6. The one-hour maximum concentration and the annual average concentrations needed for this analysis are obtained from an appropriate air quality dispersion analysis performed on the facility emitting the pollutant.

Table IV-6. Non-Cancer Reference Exposure Levels for Perchloroethylene

Effect	Non-Cancer Reference Exposure Levels	
	($\mu g/m^3$)	(parts per billion)
Acute (CNS)	6,800	1,000
Chronic	35	5

Source: *Id.* at VI-3.

Notes: (1) RELs converted from oral reference exposure levels (mg/kg/day) by assuming a 70 kg person breathes 20 cubic meters per day and equal absorption occurs by the inhalation and oral routes.
(2) CNS means central nervous system (toxic endpoint for acute effects)
(3) Acute and chronic RELs are from CAPCOA, 1993.

The potential for acute and chronic health effects from exposure to a toxic substance can also be evaluated using a ratioing method called the hazard index approach. An acute hazard index is calculated by dividing the estimated maximum one hour exposure level by the acute REL. Similarly, the chronic hazard index is calculated by dividing the estimated annual average exposure level by the chronic REL. Hazard indices of one or less are not considered to be indicative of public health impacts from noncancer toxicity of the evaluated substance. If the total chronic hazard index exceeds 0.5, CAPCOA recommends in its guidelines that the effects from background concentrations of criteria pollutants be added to the facility's total chronic hazard index. The criteria pollutants recommended for inclusion in such cases are ozone, nitrogen dioxide, sulfur dioxide, sulfates, and hydrogen sulfide.

Potential Cancer Effects: For this analysis, we will express the potential additional effect of cancer from exposure to perchloroethylene from a brake repair facility as a maximum individual risk. The maximum individual risk is the probability (expressed as chances in a million) that an individual will develop cancer, under a worst-case scenario of being exposed continuously for 70 years to the maximum ground-level annual average concentration of a pollutant. The risk is calculated as the product of the maximum annual average ground-level concentration of the pollutant and the "unit risk factor" (i.e., carcinogenic potency) specified for the pollutant.

Modeling of Perchloroethylene Emissions and Health Effects: We conducted the risk assessment by modeling the airborne perchloroethylene discharges from a hypothetical "typical" facility to estimate ground-level concentrations at varying distances. The ground-level concentrations were calculated using SCREEN3 (simple terrain), the recommended screening model as prescribed in the CAPCOA risk assessment guidelines. We used the health values for perchloroethylene specified in the CAPCOA guidelines as follows: (1) the unit risk factor of 5.9

x 10^{-6} µg/m^3; (2) the acute reference exposure level (REL) of 6800 µg/m^3; and (3) the chronic reference exposure level of 35 µg/m^3. Using data from Norton's study (Norton, 1993), we ran the model with the inputs shown in Table IV-7:

Table IV-7. Input Parameters Used in SCREEN3 Modeling (v.95250)

Parameter	Value	Source	Comments
Emission Rate, gram/sec (lb/day)	0.020 (1.3)	Norton, 1993	1.5- 20 oz can/day (67% perc w/w) Assumed pre-exemption rate
Emission Rate, gram/sec (lb/day)	0.029 (1.8)	Norton, 1993	1.5- 20 oz cans/day (100% perc w/w) Assumed post-exemption rate
Emission Rate, gram/sec (lb/day)	0.052 (3.3)	Wolf, 1996	Suggested typical rate for shops, but no documentation provided; Assumed to be worst-case rate
Source Height, m	1.5	----	Assumed height of brake job
Initial Lateral Dimension, m	3.7	----	----
Initial Vertical Dimension, m	2.2	----	----
Receptor Height, m	0	----	----
Urban/Rural Option	URBAN	----	----
Operating Schedule, hr/day and days/yr	8 hr/day 250 day/yr	Norton, 1993	----

Source: Servin, T. and G. Harris, 1996

Table IV-8 shows the results of our modeling for several scenarios representing a "typical" brake repair shop "pre-exemption," a "typical" repair shop "post-exemption," and a worst-case (as suggested by Wolf) "post-exemption" repair shop (at 1.3, 1.8, and 3.3 lbs/day emission rates, respectively). When compared to the acute and chronic RELs in Table IV-6 (6800 and 35 µg/m^3, respectively), the modeling results indicate it is unlikely for significant acute or chronic non-cancer effects to result from the emissions of perchloroethylene in the three example brake repair shops as assumed in this analysis. In addition, this finding is also supported by the calculated acute and chronic hazard indices, which are all below 1.0 and 0.5.

The modeling results in Table IV-8 are also assessed for the potential cancer risk posed by the three scenarios. The resulting potential 70-year maximum individual risks per million are 30, 44, and 77, respectively. We compared the modeling results to a "typical" drycleaning facility in California with uncontrolled and controlled emissions (i.e., pre-ATCM controlled and ATCM-controlled, respectively). The results show that a "typical" brake repair shop, under the worst-case scenarios (i.e., pre- and post-exemption) used in our previous workplace exposure analysis, results in a lower individual cancer risk than a "typical" controlled drycleaner. The results show too that the typical brake repair shop, under the worst-case (as suggested by Wolf) uncontrolled emissions rate of 3.3 pounds per day, would result in an individual cancer risk

which closely compares to the risk from a controlled "typical" drycleaner under the drycleaner ATCM.

Table IV-8. Results of SCREEN3 Modeling (MEI at 20 meters)

	Perc. Emiss. Rate (lb/day)	Max. 1-hr Conc. ($\mu g/m^3$)	Max. Annual Avg. Conc. ($\mu g/m^3$)	Individual Cancer Risk (per million)	Acute Hazard Index	Chronic Hazard Index
Brake Shop (pre-exemption)	1.3	280	5.1	30	0.04	0.15
Brake Shop (post-exemption)	1.8	400	7.5	44	0.06	0.21
Brake Shop (worst-case)	3.3	700	13	77	0.1	0.37
Drycleaner (pre-ATCM control)	6.6	1500	23	140	ND	ND
Drycleaner (ATCM-controlled)	3.3	740	12	71	ND	ND

Notes: (1) Pre-ATCM drycleaner uncontrolled levels derived from ARB, 1993, *op cit.* at VI-11 and VI-12; assumed "typical" drycleaner with max. 1-hr concentration = 1500 $\mu g/m^3$, the arithmetic mean of transfer, vented, converted, and closed-loop facilities (361,239,185,87 ppb, respectively); max. annual average conc. = 23 $\mu g/m^3$, the arithmetic mean of transfer, vented, converted, and closed-loop facilities (5.6,3.7,2.9,1.3 ppb, respectively).

(2) Post-ATCM drycleaner controlled emissions derived from ARB, 1993, *op cit.* at X-4; assumed "typical" drycleaner with emission reduction percentage = 50%, the arithmetic mean of transfer, vented, converted, and closed-loop facilities (60,80,40,75,25,65,25 percent reduction, respectively)

We also note that the potential incremental increase for individual cancer risk of exempting perchloroethylene is 14 in one million (44 minus 30). With the worst-case conditions suggested by Wolf, we find that the incremental increase for individual cancer risk is 47 in one million (77 minus 30).

The potential cancer risk assessment methodology provides an estimate of the likelihood of contracting cancer given a lifetime (70 year) constant exposure to a given pollutant. The decision to require mitigation is a policy decision based on the level of protection deemed necessary by governing boards. We compared the brake repair shop estimated existing and incremental risks to current toxic air pollutant programs addressing ambient risks (AB1807 Toxic Air Contaminant Identification and Control Program - the "TAC" Program) and near source hot spot risks (AB 2588 Air Toxics Hot Spots Information and Assessment Act - the "Hot Spots" Program).

Under the State toxic air contaminant (TAC) program, the overall goal is to reduce the public's risk from exposure to ambient levels of toxic pollutants. Pollutants are formally identified by the Air Resources Board as toxic air contaminants, and then a needs assessment is done to determine the need for and the degree of control of categories of sources. Any proposed control measure is based on technology in consideration of risk reduced and the cost. Therefore, though the estimated risks from even the worse case scenario for uncontrolled brake

repair shops are similar to those of an ATCM controlled dry cleaner, future control is not ruled out. However, before we can conclude that the estimated risks (existing and incremental) warrant control under the toxic air contaminant program, the needs assessment must be conducted.

Under the Hot Spots Act, the local air pollution control districts (districts) inventory the sources of toxic air pollutants, prioritize facilities for conducting risk assessments, determine levels of estimated risks at which a facility is required to notify the public of its risks posed, and at which a risk reduction plan must be conducted and subsequently implemented. Districts have generally chosen a 10 per million potential cancer risk for public notification and a 100 per million risk for requiring risk reduction to below the 100 per million level. The districts' programs are ongoing in determining which facilities are required to report emissions. Brake repair shops are not currently required to report emissions. However, given the estimated level of potential risk, we anticipate that districts may in the future require brake repair shops to report the amount of perchloroethylene-based brake cleaners used. Depending on the amount used, the shops may be required to notify the nearby public of the estimated risks posed. However, it appears that, based on our conservative screening analysis, risk reduction based on the Air Toxics "Hot Spots" Program would not likely be required.

Mitigation Measures

We recognize that the proposed exemption may slightly increase perchloroethylene emissions. We have therefore determined that there is a slight potential for an adverse environmental impact to air and water quality that may result from such an emissions increase. To determine whether such an increase and adverse impacts are actually occurring, we intend to closely monitor perchloroethylene use in consumer products. If our monitoring indicates that increased emissions, if any, are resulting in adverse environmental impacts, we intend to implement one or more of the following mitigation measures, as necessary:

(1) coordinate with the State Water Resources Control Board, the Regional Water Quality Boards, and local sanitation districts in their efforts to meet perchloroethylene levels in their effluent and to educate automotive repair facilities on proper product use and disposal procedures;
(2) work with product manufacturers on improved labeling instructions;
(3) improve the ARB's Compliance Assistance manuals for solvent cleaning to educate automotive repair technicians on proper spent cleaning solution disposal procedures;
(4) develop an Airborne Toxic Control Measure (ATCM), AB 2588 Risk Reduction Guideline, or similar regulation/guideline for automotive repair facilities, if warranted by detailed monitoring data and exposure estimates; and
(5) any other appropriate mitigation alternatives.

Alternatives to the Proposed Amendment

Because there is a slight possibility of an adverse environmental impact to air and water quality, we have identified the following alternatives to the proposed exemption of

perchloroethylene from the VOC definition in the consumer products regulation:

(1) no exemption for perchloroethylene;
(2) no exemption for perchloroethylene until an ATCM is adopted;
(3) exempt perchloroethylene, but prohibit new or increased uses;
(4) exempt perchloroethylene, but count it as a VOC for purposes of calculating "VOC Content" in compliance determinations for all consumer products; and
(5) exempt perchloroethylene, but count it as a VOC for purposes of calculating "VOC Content" in compliance determinations for aerosol brake cleaners only.

In the following discussion, we consider each of these alternatives in more detail.

No exemption for perchloroethylene

This option is infeasible because of the following: (a) it ignores that perchloroethylene, at current levels, does not significantly contribute to ground-level ozone, (b) since perchloroethylene is exempt in the rest of the nation, manufacturers selling perchloroethylene-containing products in California would be at a competitive disadvantage, (c) because we have determined that adverse environmental impacts are very unlikely as a result of this proposed exemption, this alternative would impose an onerous burden on manufacturers with little or no environmental benefit, (d) this alternative would impose an additional cost on businesses by decreasing their formulation flexibility, and (e) manufacturers reformulating products containing perchloroethylene may replace it with more reactive VOCs, resulting in higher ground-level ozone.

No exemption for perchloroethylene until an ATCM is adopted

We do not believe that this alternative is necessary at this time because our analysis indicates a significant increase in perchloroethylene emissions is improbable. However, we have not ruled out the need for an ATCM developed under the State's TAC Program, whose goal is to reduce overall ambient air cancer risk. The higher end of our assessment, based on a worst-case scenario, shows a potential excess cancer risk of 77 per million. We believe that this is a highly unlikely scenario. If it does occur, the Air Toxics "Hot Spots" Program will address it on a case-by-case basis. However, as we continue to assess options for reducing ambient potential cancer risk under the TAC Program, we may revisit the need to develop an ATCM for aerosol brake cleaner use.

Exempt perchloroethylene, but prohibit new or increased uses

This alternative is similar to the prohibition in the aerosol coatings regulation. While the prohibition in that regulation was feasible and necessary, it is not a feasible or necessary alternative for the consumer products regulation at this time. It was feasible in the aerosol coatings regulation because there was essentially no use of perchloroethylene in those products. Additionally, it was necessary because the total tonnage of aerosol coatings are estimated to be about 9 times the aerosol brake cleaners tonnage (32 tpd vs. 3.5 tpd; ARB, 1995c; ARB, 1991). Thus, the potential for a significant increase in perchloroethylene emissions is much greater in

aerosol coatings than it is in aerosol brake cleaners.

Exempt perchloroethylene, but count it as a VOC for purposes of "VOC Content" calculation

This alternative is similar to the treatment of methylene chloride in the aerosol coatings regulation. It was feasible and necessary for the aerosol coatings regulation because the potential for increased use in those products is more significant than it is for aerosol brake cleaners (ARB, 1995c, *op cit*. at pp.24-25). As discussed earlier, the potential for an increase in perchloroethylene emissions in aerosol brake cleaners is much smaller than it is for aerosol coatings.

Exempt perchloroethylene, but count it as a VOC for purposes of "VOC Content" calculation for aerosol brake cleaners only

This alternative is infeasible because it would impose an undue economic burden and flexibility constraint solely on aerosol brake cleaner manufacturers, based on a highly unlikely possibility of an adverse environmental impact. Additionally, this alternative has the likely impact of increasing ground-level ozone, because manufacturers may increase emissions of more reactive VOCs as a result of reformulating or decreasing the perchloroethylene content in their products.

Overriding Consideration for the Proposed Exemption of Perchloroethylene from the Consumer Products Regulation

In the previous discussion, we identified one negative environmental impact that could potentially occur as a result of increased perchloroethylene emissions. However, this amendment is intended to remove a chemical which does not significantly contribute to ground-level ozone from regulations whose purpose is to reduce emissions of compounds that contribute to this problem. In addition, the proposed exemption will increase formulation flexibility and make the VOC definition in the consumer products regulation consistent with the U.S. EPA's VOC definition. This will eliminate the competitive disadvantage in a situation where companies, manufacturing products for California, are faced with a California versus 49-state VOC definition. We believe that these considerations override any adverse environmental impacts that might possibly occur as result of this amendment. Additionally, as the above discussion indicates, we do not believe these negative impacts are likely to occur. However, because of the potential for a negative impact exists, we have discussed how we will monitor perchloroethylene emissions and have identified potential mitigation measures. Other than the measures identified in this chapter, there are no other feasible mitigation measures that would reduce possible environmental impacts while at the same time provide the benefits of increased fairness, flexibility, and competitiveness realized by these amendments.

2. Economic Impacts Analysis

Summary of Economic Impacts

The proposed amendment would not require manufacturers to do anything differently. It would simply mean that any perchloroethylene used in a product formulation would not be counted as a VOC. Because of the increased flexibility in the reformulation of new products that would result from this modification, we expect no significant adverse impact on: manufacturers' profitability; employment in California; the status of California businesses; or competitiveness of California businesses with other states. In fact, because of the overall cost savings that may result from this amendment, manufacturers may experience a positive economic impact. The California consumers may also benefit from the availability of more types of products and less expensive products, if manufacturers' cost savings are passed on to the consumer.

Businesses Affected

Any business which manufactures or markets products subject to the requirements of the Regulation for Reducing Volatile Organic Compound Emissions from Consumer Products (sections 94507-94517; the "consumer products regulation") can potentially be affected by the proposed modifications. Also affected by the amendment is the Alternative Control Plan regulation (sections 94540-94555), as the definition in the consumer products regulation is included in the Alternative Control Plan regulation by incorporation.

Economic Impacts

The proposed amendment to exempt perchloroethylene from the VOC definition in the consumer products regulation would provide additional options to a few manufacturers of limited product categories faced with reformulating to meet upcoming VOC standards. There may be a cost savings realized by these few manufacturers as a result of this increased flexibility. To the extent that these cost savings are passed on to consumers, they may also realize a savings benefit in the form of less expensive products.

Since the proposed amendment affects all manufacturers and marketers in the same way, regardless of their location, California businesses would not be at a competitive disadvantage. Also, the proposed amendments would have no noticeable impact on employment and the status of business in California, because they impose no additional costs on businesses.

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V.

LOW VAPOR PRESSURE (LVP)-VOC EXEMPTION PROVISION

A. INTRODUCTION

The consumer products regulation exempts those VOCs which have low volatility as indicated by the individual VOC's vapor pressure. At the time the regulation was first adopted in 1990, the ARB staff believed that it was important to focus on the emission reductions from the higher volatility/vapor pressure compounds. For this reason, a vapor pressure cutoff of less than 0.1 mm Hg at 20^{o}C was identified and incorporated into the regulation when establishing this exemption. A carbon-number cutoff of greater than 12 carbon atoms was chosen as a surrogate to vapor pressure in the absence of appropriate vapor pressure data. Specifically, section 94510(d) of this regulation provides an exemption for any VOC which has the following characteristics:

(1) a vapor pressure of less than 0.1 mm Hg at 20^{o}C, or
(2) consists of more than 12 carbon atoms, if the vapor pressure is unknown.

This exemption is commonly referred to as the low vapor pressure or "LVP" exemption. This exemption allows compounds to be omitted from the VOC calculation which would otherwise be considered VOCs. In practice, this means that there is no regulatory limit on the amount of LVP compounds that may be used in consumer products.

When the consumer products regulation was adopted, the available literature indicated that most compounds which would qualify as LVPs generally could be classified as high molecular weight resins such as the polymeric resins used in hair sprays, surfactants, waxes, and other solid or semi-solid product ingredients which were not expected to significantly evaporate and contribute to ozone formation. The use of these types of LVP compounds was accounted for when establishing standards for the categories in the consumer products regulation.

B. CURRENT IMPLEMENTATION OF THE LVP EXEMPTION

Since adoption of the consumer products regulation, several types of low vapor pressure liquid VOC solvent mixtures which can either completely or partially meet the vapor pressure or carbon-number cutoffs have developed and used by consumer product formulators. While the regulation allows the use of these mixtures, their potential for widespread use as solvents makes it important for the ARB to develop a test procedure to quantify and verify that only LVP-VOCs are exempted from the calculated VOC content. Additionally, when solvent mixtures rather than pure compounds are used, manufacturers have shown us that it is difficult to characterize each component to the extent necessary to obtain the exemption.

In response to manufacturers' requests, we agreed that in the interim period use of a general method for mixtures, such as that proposed by Exxon Chemical, is appropriate. Exxon

proposed the use of ASTM D86, with a Maxwell-Bonnell vapor pressure-initial boiling point correlation at 20ºC as an indirect measure of the vapor pressure of the mixture. However, we indicated that we were in the process of developing a test procedure that can reasonably determine what portion of these mixtures consist of individual compounds that conform to the LVP criteria. We emphasized that there is no guarantee that the test method (or methods) ultimately adopted by the Board will yield the same results as the method used by Exxon Chemical. Therefore, this method can only be used until such time as the Board adopts a new test method and the method becomes legally effective.

C. GOALS FOR THE LVP EXEMPTION

As committed to, the ARB staff has been developing a procedure that can reasonably determine if the individual compounds in the mixture conform to the criteria in the LVP exemption. Our goal in developing this procedure is to incorporate methods less extensive than those required for complete speciation and characterization of a complex mixture.

D. CURRENT STATUS OF PROCEDURE DEVELOPMENT FOR THE LVP EXEMPTION

The ARB staff has been working to develop a procedure that can reasonably determine if the individual compounds in the mixture conform to the criteria in the LVP exemption. A draft test method has been developed which constitutes a modification to American Society for Testing and Materials (ASTM) D2879-92, referred to as the "isoteniscope" procedure. ASTM D2879-92 most accurately measures the vapor pressure of pure liquids. The modification of the procedure is intended to improve the accuracy of the procedure when measuring the vapor pressure of VOC liquid mixtures. The modified isoteniscope procedure will be proposed to the Board when the method has been peer-reviewed and an interlaboratory comparison analysis is completed. Corresponding clarification of the language for the LVP-VOC definition will also be made.

E. FUTURE PLANS TO ADDRESS THESE ISSUES

Although we will not be including the modified isoteniscope procedure in ARB Method 310, and have decided not to propose significant changes to the LVP-VOC provisions at this time, the issues regarding the VOC mixtures described above remain. Resolution of these issues is to everyone's benefit. Industry would gain certainty as to the status of these "LVP" mixtures (i.e. entirely or partially exempt) from a clearly defined testing procedure. Air quality would benefit in that compounds not conforming to the LVP criteria would be correctly counted as VOCs. For these reasons, we plan to continue our method development, and we will continue to work closely with industry in the near future to resolve these issues to everyone's satisfaction. We anticipate that this effort will take several additional months to complete. As part of this effort, it may be necessary to conduct a survey to determine the

amount of hydrocarbon mixtures used in consumer products. This information would be needed to determine the potential impacts on industry when the modified isoteniscope procedure is proposed for Board adoption.